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SUSPENSION LARYNGOSCOPY AND ITS ACCOMPLISHMENTS.*

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NEW ORLEANS.

Can you imagine the peculiar sensations that must have greeted Prof. Gustave Killian when he viewed for the first time the larynx of a cadaver brought into view by a tongue depressor, placed over the tongue and epiglottis, the handle of which was swung from a support at the side of the table, the subject's head hanging free?

To sit comfortably in front of the open mouth and to view deliberately the larynx, without the "time honored" fatigue of either your arm or that of an assistant, must have created a certain sensation of joy and satisfaction hard to describe. This was the birth of suspension laryngoscopy, some time in the winter of 1909. According to Killian, much experimental work was done until the method was decided to be sufficiently developed for presentation to the laryngologic world at the International Laryngological Congress in Boston, in 1911.

*Candidate's thesis to the American Laryngological Society.

From this period until the present time the method has been used by laryngologists the world over, and as a natural consequence there began to appear varying views and modifications.

At a meeting of the American Laryngological, Rhinological and Otological Society, held in Washington, District of Columbia, in May, 1913, I saw Dr. Wolff Freudenthal demonstrate the apparatus, and later had the pleasure of viewing the larynx of a case suspended by him, at the Beth Israel Hospital, New York City. I became enthused with the possibilities of the method and purchased an instrument of the latest Killian design.

I began the use of the suspension laryngoscope, and with the increasing acquaintance I dreamed more and more of its possibilities, but at the same time realized that much was lacking in what I had considered a "perfect" instrument. I was soon impressed with the fact that the range of usefulness of the outfit would be decidedly limited unless I were able to view the anterior commissure of the larynx in every case. The children gave me but little trouble, but in adult cases I could not see nearly as much as I desired. Small tumors far forward in the anterior third of the larynx were not in view, and try as I might, I could not adjust the instrument satisfactorily. The "gallows," as Prof. Killian has called it, was not long enough; its attachment to my operating table was not straight or square, its motion horizontally was limited, and many times I felt that if it were only four inches longer I could see ten times better. The hook was frail, and after use on an adult case, would have to go to the instrument maker to be straightened. Then I could not gain space enough through the opening to see well, realizing that a Jackson or a Mosher spatula would yield a much broader field of view. The tongue would slip from side to side, and when in the middle line would so fold around the spatula as to convert the field of vision into a tube whose caliber was too small for any use.

To correct these troubles was now my desire, for it was always plain that the principle as proposed and executed by Killian was thoroughly proper and correct. Taking then my goal of acquirement, the anterior commissure of the larynx with a wide open mouth and an unobstructed view of the parts concerned, I set about to surmount the difficulties as they arose and as they appeared to me.

I had made a table top from a cypress board six feet long and eighteen inches wide, fixed with clamps to fit my operating table so that it would be perfectly rigid under all circumstances. At one end a section twelve inches deep and fourteen inches wide was cut out, and hinged to drop at right angles to the surface, this leaving a projecting platform four inches wide and twelve inches long, the purpose of which was to increase the horizontal traveling distance of the gallows, by placing the clamp of the gallows forward of the shoulders instead of behind them, as is necessary under ordinary circumstances. Again, the hinged portion did away with the necessity of having to drag the patient over the head of the table after the sterile goods had been placed, and a most uncanny feeling to a patient under local anesthesia. The table top in its original pattern I still use, and feel that it is one of the very essential units for success. A "wabbly" table is a source of trial at all times, and in one instance my patient actually slipped off, falling to the floor because of the nonbalance produced by the extension of the head beyond the table top, and the body weight coming beyond the center of gravity.

The tooth plate of the mouth gag would invariably stick, its movement—only a quarter inch—was entirely too small to suit all cases, and it was always necessary to make the adjustment before being applied. Again, the vertical opening of scarcely one inch was not as long as the mouth would stretch nor large enough for me to see as well as I might. Accordingly, I had constructed the tooth plate and mouth gag described by me at the twentieth annual meeting of the American Laryngological, Rhinological and Otological Society, in Atlantic City. This modification permitted of an increase of one inch in the vertical and one in the horizontal, the latter being controlled by a screw which was more powerful and accurate, and would not stick and jam. I worked with these modifications for some time, satisfactorily I thought, when one day I could not get away from the milled head of the adjusting screw. I could see it all the time, as one must see the black spots in scotoma; then the platform through which the tooth plate traveled would project into the mouth cavity beyond the tooth line, which interfered very much in the dissecting operations; and finally, while suspending a husky farmer of

about two hundred pounds, it bent so decidedly under the strain, that I felt that it was neither safe nor satisfactory.

Again, the tongue on the main frame to which is attached the various tongue spatula and which acts as a guide for the vertical movements of the mouth gag, and which must bear the brunt of the leverage, was found first of all to be of brass and consequently to bend easily, and this would actually occur after nearly every case of any size. Then the screw which was used to operate the vertical movement of the mouth gag was so small that it was at times impossible to move it at all during the various stages of introduction.

I set about to correct these shortcomings by making the frame of the instrument of the shape of a reversed L, with the screw that operates the mouth gag working through the end of a horizontal branch of the L, the advantage being a large screw head that could be grasped well and that could be moved at will, even in the heaviest cases. The tooth plate was made to extend for nearly two inches horizontally, working by a worm gear joint and swivel near the tip. This placed nothing in the mouth cavity beyond the tooth plate, allowed of a wide opening of the mouth and was thought to surmount all of the difficulties. It was this instrument that was shown at the meeting of the Middle and Western Sections of the American Laryngological, Rhinological and Otological Society at Cincinnati. This whole apparatus proved mechanically wrong, and I have mentioned it for that reason. The center of gravity was not in the middle line, consequently the instrument would pull to the side, necessitating the continuous holding of the head by an assistant. The screw moving the mouth gag was pitched too high and would jam so as to be perfectly immovable because the weight was off center. The worm gear joint could not be made strong enough to withstand the weight, and would bend up so as to give but a small opening to the mouth. I will never cease regretting that it was ever displayed.

The instrument that I have been using for the last six weeks has many points in its favor, and seems to be entirely satisfactory up to this time. One realizes that the main requisite for one instrument to suit all cases and conditions is flexibility. I mean by this a wide range of motion in every possible

direction, all in excess of what is usually needed, that they may be called upon in the unusual cases.

As my work is done on adults as well as on children, I have felt the necessity for strength and power, to overcome the greater muscle tension met with in most adults. Therefore, the new instrument is very much heavier in all its parts, and is thought now to be able to stand the severest test possible. The main frame is of heavy steel, broader and thicker than the original, mainly to secure a large milled screw used to open the mouth gag in the vertical direction. This has permitted a larger and stronger shaft to the gag, and the thread is pitched lower to give greater power. In addition, the screw is drilled throughout its circumference to permit the use of a lever or handle, as is done in the manipulation of an ordinary jack screw. The mouth gag will now open to a full one and three-quarters inches on the inside, which is much in excess of what is usually required.

The tooth plate of the mouth gag should move freely in the plane of the tongue spatula—a range of motion that is necessary for jacking up the epiglottis and which renders the length of the tongue spatula variable and does away with any projection in the mouth cavity that may obstruct the view. To accomplish this I utilized the principle of a pear-shaped ring attached to the frame, the movement of which is controlled by a thumb screw. By it one can easily introduce the tooth plate well beyond the line of the teeth of the superior maxilla and so move the tip of the tongue spatula at least one and a half inches. This will permit of the use of the shorter spatula and so bring the operator nearer his work. At the same time there is developed a slightly tilting motion to the tip of the spatula, which will tend to elevate the epiglottis well beyond the field of view. Another feature embodied here, and which is an innovation not before mentioned by Killian or others, is the provision of adjustable single or multiple tooth plates. One, two or three can be used, depending upon the size, condition and shape of the superior maxilla under suspension. This feature is of especial service in changing from children to adults and from V-shaped to circular arches. Again, it will permit the fixing of the base of a triangle formed by the tooth plates at two points, the tip of the tongue spat-

ula as the apex, and thus prevent the tongue spatula from slipping from side to side and losing one's view in the middle of an operative procedure.

Finally, the base to which the tongue spatulas are attached has been strengthened so as to meet the most rigid demand. The tongue spatulas have been modified into the form of a slight curve with fixed flanges, to prevent the infolding of the tongue. Also, one spatula has been made with movable or adjustable flanges, but this is more complicated and has not seemed necessary.

TECHNIC.

Perfect relaxation and quiet are fundamental for the work, and the anesthetic to acquire these satisfactorily in the patient will depend upon the condition requiring treatment.

In children, general anesthesia is by far the best and safest, administered by a trained anesthetist, using some form of warm ether vapor. I select ether always for general anesthesia, using the warm ether vapor as delivered by the Cain-McDermott ether apparatus, or by compressed air as is used at the Ear, Nose and Throat Hospital in New Orleans, and insist upon my patient being kept continuously in the surgical state of anesthesia, instead of being allowed to awaken intermittently, as would be the case in ordinary open cone anesthesia; a most unsafe state for the patient and designed to interfere most annoyingly with the work to be accomplished. The bronchorrhea complained of I have never seen in any of my cases, and so far have had no complications of any kind to tabulate.

My anesthesia has been so perfectly satisfactory that I have never felt the necessity of employing either rectal, intravenous or intratracheal anesthesia as a substitute. With the ether being delivered into the mouth through a tube or mouthpiece by compressed air, the anesthesia is under the perfect control of the operator, who can watch this phase of the work—a source of much satisfaction to me. I do not use morphin and atropin before general anesthesia, for I have no desire to benumb the cough reflexes; then, too, many of the cases suffer some from respiratory obstruction, which the administration of morphin may increase still more.

In local anesthesia for adults of a suitable age, I am accus-

tomed to administer morphin, grain one-sixth to one-fourth, and scopolamin, grain one one-hundred-and-fiftieth to one one-hundredth, hypodermically, one hour before operative time. Then with the patient sitting, I apply gently first to the uvula and then to the posterior pharyngeal wall a ten per cent solution of cocain on a cotton applicator. This the patient is requested to spit out. The movements of the parts required in this act are sufficient to procure fair anesthesia of the fauces and postpharyngeal wall. This prevents gagging which, once started, is hard to control. I then drop from a laryngeal syringe about ten drops of a ten per cent solution of cocain onto the base of the tongue, lingual face of the epiglottis and hypopharyngeal wall, requesting the patient to hawk and spit immediately, that none may be swallowed. A rest of two to five minutes is taken, then from five to ten drops of the same solution is dropped upon the tongue, and the patient is requested to cough immediately, that the excess be removed, thus obviating the possibility of toxic absorption. With a short period of rest the patient is put upon the table prepared for suspension.

Some form of suction apparatus is an absolute necessity to care for the secretions from the salivary glands, and fluid from the esophagus, also to remove those blood clots which collect upon the posterior tracheal wall as far down as the bifurcation, for picking up fragments of tissue that may be loosened from the grip of the retaining forceps, and to render the operative field clear, reducing the traumatism of sponging very materially—a very important factor in laryngeal work.

The patient ready, we proceed as follows, with all parts except the face covered with sterile goods: The gallows is fixed to the platform of the table top, usually from four to six inches beyond the hinged portion, or forward of the patient's shoulders, so that its traveling distance in the horizontal is markedly increased. The coarse vertical adjustment is lifted to its limit and the clamps securely fastened. All parts are seen to be tight and solid, that no accident or slip may occur from this source.

The patient is so placed upon the table that his shoulders will project about two inches beyond the hinged joint. This will allow for the hyperextension of the head and keep movement of the occiput from being blocked against the table top.

An assistant standing to the right of the table or crane side, facing the head, holds the head firmly in both hands, being sure at all times to keep the head straight with the body. The hinged portion is dropped and the head is extended somewhat, as is shown in Figure 1.

I usually now fold a piece of gauze over the teeth of the lower jaw and crowd the tongue back into the mouth, to avoid pinching or lacerating the tongue by its pressure on the teeth —an accident which has occurred several times.

A suitable tongue spatula and tooth plate having been previously selected and adjusted, the mouth is opened, the instrument closed, the spatula is passed back over the tongue to reach the postpharyngeal wall. The worm gear joint on the shaft of the instrument is adjusted to an angle to lift the hook end away for the assistant's arm, as is shown in Figure 2. The spatula will now assume the relative position as is shown in Figure 3.

The head is still further extended and held in the middle line, the tongue in the middle line, the tip of the spatula following along the posterior pharyngeal wall, the tooth plate being placed behind the incisor teeth of the upper jaw, and the hook adjusted into one of the notches of the traveling crane, as is shown in Figure 4.

A firm hold is maintained on the instrument at all times, that it does not slip from side to side, and all movements are kept in full view at all times.

Now the tooth plate represents the fixed point of the instrument, the tip of the tongue spatula, the movable point, and by turning the screw that moves the ring to which is attached the tooth plate, we succeed in driving the tip of the spatula further into the mouth along the hypopharyngeal wall under the epiglottis, which procedure I have nicknamed "jacking of the epiglottis." The patient's head now hangs free, but a firm hold is maintained upon the instrument, that no movement may displace it. I call your attention to the plane and position of the spatula, as is shown in Figure 5.

The tip of the spatula is shown in Figure 6.

One can usually see now the pyriform sinuses, the opening of the esophagus, and the esophageal surface of the arytenoids. (Figure 7.)

The teeth are here examined, and if the lips and tongue are not pinched, the patient's general condition is noted for comfort and safety.

The worm gear joint on the shaft is now straightened, which will have the effect of lifting the tip of the spatula toward the epiglottis, and of swinging the head into extension, but I do not carry this movement as far as Killian, for I do not have the transverse portion of the crane to overlay the tip of the tongue spatula, as Killian suggests. (Figure 8.)

The horizontal movement of the crane is used to assist in tilting the tip of the spatula upward, that I may still further straighten the road to the larynx and gain a wider field of view, as is shown in Figure 9.

At this moment usually all is in fine view but the anterior quarter of the larynx—tonsil pillars, palate, uvula, hypopharyngeal wall, pyriform sinuses, mouth of the esophagus, arytenoids, posterior three-fourths of the vocal cords, trachea to bifurcation, etc. To gain the anterior commissure, the vertical movement of the crane is utilized to swing the head free of all support, and in some instances even the shoulders are lifted by this movement. Then the crane is moved horizontally and the epiglottis jacked a little more, until finally we see the anterior commissure of the larynx standing well before us, as is represented by Figures 10, 11, 12.

I must call your attention to the marked differences in the two positions, as pictured by Killian and myself. In the former instance, the crane occupies a position far below the patient's head, the transverse portion of the crane must overlay the tip of the tongue spatula, which will bring the spatula in a perfectly straight line. Since we know, as proven by Jackson and others, and as is shown very nicely by Iglauer in a radiograph in the *Laryngoscope* (June, 1913), that the larynx and trachea do not proceed in a perfectly straight line into the chest, but go downward and backward, a perfectly straight line view will not show the anterior commissure in those cases where marked muscle development is present. While in my position, by gaining marked tilting of the tip of the spatula, this muscular tension is overcome and you can acquire a view of the anterior commissure in those cases not otherwise possible.

By referring to Figure 13, Killian's position, the relation of

crane to head and tip of spatula will be noted, also the spatula is seen to occupy a straight position in the mouth, which will not show the anterior commissure. In this case, under suspension (a cadaver), the position of crane hook and spatula, as shown in Figure 14, is the one assumed by me in most instances. The spatula tilted up at its tip, pressing the epiglottis forward to the hyoid bone, as can be seen from the angle of frame of hook, also the straight line assumed by the neck, which I believe is necessary to see the anterior commissure and which is absolutely necessary in adults and rigid cases. As the case is suspended, the anterior commissure can be seen perfectly well, and in this position it is possible to do any of the intralaryngeal operations.

In Figure 15 I have attempted to photograph the view of the larynx as is shown in Figure 14, a small tungsten lamp being placed inside of the mouth and the picture taken with the camera that I used in the other illustrations. While the photograph is not quite clear enough to study the anatomy of the part, the cords, both false and true, and the anterior commissure can be recognized. I call your attention to the view obtained and the advantages of this instrument over the others now in use: First, the broad ring to which is attached the mouth gag, brings the pressure in the middle line and balances the instrument in place, at the same time removing every part of the instrument from obstructing the view of the mouth cavity and parts beyond. No screw heads either to the side or in front attract the attention of the eye or furnish a projection upon which instruments, gauze, etc., may catch during operative work. Again, the ability to open the mouth wide and the large lateral measurement, will permit of the free use of tubes, both bronchoscopic and esophagoscopic, in conjunction with this instrument.

The use of multiple and adjustable tooth plates which are here possible will give additional service in procuring the proper view, besides being adaptable to various mouths, teeth, etc.

In cases where the epiglottis is made up of very thin cartilage, the structure falls back against the postpharyngeal wall, and when caught up by the spatula will bend backward and form a roll that will obstruct the view of the anterior

commissure, or when that organ persists in slipping from the hold of the tongue spatula and falls like a curtain over the view, or, as occurs sometimes, it rolls under the spatula and folds with its free edge towards the larynx. When it is kinked near the cushion, I have found that driving the epiglottis straight with two bridle sutures placed on either side of the middle line, as is shown in Figure 17, will straighten out all these irregularities. The spatula is introduced along the base of the tongue until the epiglottis is seen and held in this position while the two bridle stitches are placed, then the spatula is removed, and while the tongue is crowded into the mouth, tension is made upon the sutures, drawing the epiglottis straight. The spatula is then introduced as described, and the sutures will lie then between the tongue surface and spatula. If the pressure here is not sufficient to hold them in place, I tie them to the frame of the instrument.

In introducing the spatula, if the tongue should slip to one side and heavy extension is made, one is liable to tear the pillars of the fauces on the side of greatest tension. If force is used in sliding the spatula along the postpharyngeal wall, a bruise or laceration may be produced in this region. The tongue should be kept in the center.

In the mouths of old people, where the teeth are brittle or carious or uneven, one may have trouble in finding a suitable base for the tooth plate to rest against. My adjustable tooth plates will correct this, or some form of dental mould can be made to distribute the pressure along the upper jaw. A rubber tube split longitudinally and slipped over the teeth will keep them from harm; likewise a small roll of gauze placed between the teeth and the tooth plate will not slip, and will relieve the pressure of the metal against the teeth.

By following the advice to pull the tongue out of the mouth at the beginning of the introduction of the spatula I have bruised it many times. This can be overcome by crowding the tongue back into the mouth and placing a roll of gauze between the under surface of the tongue and the inner aspect of the teeth of the lower jaw. I do not pull the tongue forward at all now—it finds its way forward too many times. Hematomata and lacerations may develop at the tip, which so far have amounted to nothing except for the soreness and inconvenience. They usually subside within ten days.

Before removing the instrument from the mouth the secretions accumulated in the cavity of the hard palate and in the nasopharynx should be removed by the suction apparatus. If not, when the head is replaced on the table top the fluid will flow back into the anesthetized larynx and may upset the patient considerably by choking, etc.

A part of the work done under or by the aid of the suspension laryngoscope can also be done by either the indirect method with mirror, etc., or by the aid of one of the direct spatula or tubes now in use. To sum up in one word the value of suspension laryngoscopy, I should say it induces accuracy. It is quite true that pedunculated tumors of the vocal cords can, have been and are being removed by the mirror and forceps, but the procedure is a tearing one every time. This cannot be compared with the accuracy that accompanies the procedure of picking up the tumor mass with a pair of forceps and dissecting it from its base with a knife or scissors.

Papillomata have been removed time and again through a straight tube or spatula, but they always recur, and one is tired long before the larynx is clear, and the papilloma have recurred almost before the instruments are clean. On the other hand, I report fourteen cases removed by dissection, each in one sitting, and none has recurred to this time. St. Clair Thompson reported his brilliant result of the removal of an intrinsic malignant growth from the larynx. The operation was a "tearing" one, as described by him. I have four to report, of removal by dissection wide from the growth, with no recurrence up to this time—the oldest being nearly two years.

Cauterization of the larynx for tuberculosis that cannot be done except by the most skilled, can be done far more accurately and with less pain by one not so skilled, aided by suspension.

I have destroyed two rather large squamous celled epithelioma involving the hypopharyngeal wall near the mouth of the esophagus, by the "Percy" method of cautery. The cases are now free from return and the surfaces cicatrized. This would have been perfectly impossible without the aid of suspension.

Intubations can be done, foreign bodies removed, abscesses

opened and radium accurately placed and maintained. Parts can be inspected that have never before been seen—namely, the under surface of the vocal cords and the ventricles of the larynx—by the use of my "tilting mirror." Finally, stitches can be placed in any part under view, and all operative work can be carried on in a thoroughly surgical and scientific manner, as is practiced upon the skin surface. The work is at all times in perfectly full view of the operator, and he is free to be as accurate as possible in every move, sitting comfortably with both hands, not even a tired muscle strained or assistant to worry about.

In reviewing my work with the suspension laryngoscope and the dissecting instruments, I am struck forcibly by three facts: 1. The ease of acquiring the technic—in fact, the technic is acquired during hospital life and under the early instruction in general surgery. 2. The absolute accuracy and deliberation with which one works, having both time to think and to act without the fear of losing the field, as occurs in the indirect and direct methods. 3. The very mild amount of reaction that occurs after what would seem the most unwarranted abuse of such a structure as the larynx.

In proceeding with the surgery of intrinsic growths, preparation to work may be made in this way: The patient is suspended and is perfectly quiet and comfortable, or as nearly so as possible, under either local or general anesthesia. The larynx and anterior commissure of the vocal cords are in full view, all parts are fixed and the field well lighted either by head mirror, Klar, Kirstein attachable or detachable electric lights. The larynx is tested with a cotton mop of ten per cent cocain, and if slight reflex occurs, the mucous membrane of the larynx only is painted until all local sensation is gone. In some cases it will be possible to inject cocain or novocain with my extension syringe into the tissues of the larynx for anesthesia. Once anesthetized, the surface is painted or scrubbed gently with argyrol solution, twenty per cent, or pure alcohol, that it be rendered as nearly clean surgically as possible.

Vocal nodules are picked up carefully and examined to be sure that nothing but nodule is in the forceps, when the small tumor is carefully cut from its base.

Pedunculated tumors are treated likewise, their point of attachment being sought. It is striking how many grow from the loose area just under the vocal cord, instead of from the vocal cord itself, as appears upon indirect examination. Here the cord is lifted up or turned back so that the attachment can be seen and the tumor removed with its base included, the raw surface remaining being either covered with the compound tincture of benzoin as a dressing, or stitched, as was done in one case by me, where the raw surface was unusually large.

In papilloma I have found my greatest pleasure in the fact of being able to remove them completely at one sitting, without recurrence. Some of my cases are over a year old and have not recurred as yet, and are still under observation.

Inasmuch as papillomata of the larynx differ in no way from those on the skin or other mucous membrane surfaces, why should they recur so persistently in this locality as against all others? It would seem the only answer is, incomplete removal. Why should this be? Because we have never before been able to operate with anything but punching or pinching forceps, neither of which will remove completely a papilloma from its base.

I have had fourteen cases with no recurrence in any instance. The first case, operated on in July, 1913, is still free from papilloma, has a very good voice, and is perfectly well. I referred to him as "Buster" in the article before the American Laryngological, Rhinological and Otological Society, June 19, 1914. The case referred to in the same article as "D. B." has an interesting history. After the removal by dissection in August, 1913, she returned home, and remained well until February, 1915, when she returned again to the clinic with some hoarseness. I was sure, upon hearing her voice, that now I must tabulate my first failure, when upon examination I found that there was a small papilloma developed beneath each vocal cord. I remembered that no papilloma was found beneath the vocal cord at the operation, and in looking into the larynx the parts above the cords were perfectly free, while just beneath the cord these two small weak looking masses appeared. I removed them by dissection, and she has since had no return of any kind.

For papilloma I proceed by picking up the growth with a hook or mouse tooth forceps, planted as near the base as possible, and dissect cleanly well beneath the growth, taking care not to injure muscle tissue, so as not to limit the function, if possible. After dissecting clean all the involved surface, the base is scraped thoroughly with a spoon curette and the raw surface left swabbed with pure alcohol.

I have never given arsenic or used radium or any other agent to retard the growth; I depended on my dissection, as I was anxious to be certain that the lack of return was to do nothing else but clean dissection.

I have removed four malignant intrinsic growths of the larynx, one spindle cell, the other squamous cell epithelioma. My first case, referred to at Atlantic City meeting as "Mr. B.," is still free from any sign of return, is hard at work and enjoying good health.

"Joe C.," colored, was operated on by my method in June, 1914, tumor occupying the anterior half of the right vocal cord, extending to the commissure. He is a professional singer in negro vaudeville, and weighs about one hundred and ninety-seven pounds. With suspension under local anesthesia I removed by dissection down to the cartilage the anterior third of the left vocal cord, the right cord back to its vocal process, and the tissue for about one-half inch on the cricord below the vocal cords. His recovery was very rapid and complete, and he now has a moderately fair voice (not singing) and is so far without recurrence.

"Mr. H.," operated on in January, 1915, and "Mr. T.," in March, are too recent, except to say they have both healed nicely and are at this minute healthy and well (April 20, 1915).

The cases of malignancy of the larynx suitable for this procedure must be carefully selected. The tumor must be purely intrinsic. If the joint has been fixed for some time and the history that of a fairly rapid growth, I would hesitate to use the method. If the arytenoid is edematous and a progression here is feared, if it would seem to extend subglotically to the cricothyroid membrane, or if cervical glands are palpable, then I would not select this method.

All four cases were practically well on the fourth day after

the operation, there being no temperature or any symptoms that gave the least amount of concern. In none has there been the slightest disposition to edema or stenosis at any time —in fact, I am still surprised at the practical absence of inflammatory reaction. I believe the possibilities of recurrence are lessened here, because of the fairly sterile field under which healing takes place, with no external wound or separation of the thyroid or cricoid cartilages. It has been through this pathway that my thyrotomy cases have recurred. I have not had a sufficient number, nor sufficient time to formulate anything that would be more than a mere personal thought.

I have destroyed by the actual cautery two squamous celled cancers growing from the mouth of the esophagus, both tumors occurring in men of about seventy years of age, one a negro, the other a white man. In one the tumor involved the posterior surface of the arytenoid, and was beginning to go down the esophagus. Under suspension, with the mouth wide open and a current of air playing in the mouth and the suction carrying off the smoke, and assistant's hand on the surface of the neck guarding the temperature through the skin, I proceeded to burn through the growth in all directions, after the method of Percy, being careful that the temperature was not sufficient to char the tissues, but enough to turn them to ashy white. The sitting required about fifty-five minutes. The patients went through their convalescence nicely and are still free from recurrence. Both are still under observation and will furnish material for a later report. These cases were done in the early part of December, 1914. I think this is the first reported instance of this method under suspension, and in dealing with tumors this way. In the case of a pedunculated epithelioma growing from the postpharyngeal wall, just above the arytenoid cartilage in an old negro man of about sixty-eight years, I dissected the tumor free from its attachment well below its base. There was left an open surface of one and one-quarter inches long and about half an inch wide, which I closed nicely by fine catgut sutures, using the smallest Lane needle and No. 0 plain catgut. This was done in November, and the patient is still well.

The immobility of the larynx under suspension renders the operation of cauterization of tuberculous ulcerations accurate

and certain, without danger of destroying healthy tissue. I have operated on four cases of this type with uniform good results, relieving pain, adding to the comfort and prolonging the life of the patients.

I have removed a peanut from the bronchus of a baby fourteen months old, under suspension, with my speculum for separating the vocal cords. I removed a few masses from the trachea, and a large part of the kernel impacted in the right bronchus. It required no anesthetic nor a tube for this work.

Suspension was used in the removal of an open safety pin from the esophagus of an eleven-months-old child. The clasp, imbedded point upwards behind the cricoid cartilage, was caught with one pair of the baby forceps, the spring end with another, and the pin rotated so as to lie with its point downward towards the stomach, changing hold the forceps from the clasp end, now caught the point side of the shank and bent it in so as not to catch the side wall. The spring end was then brought up and out, with the point guided by the other forceps so as not to injure the wall of the esophagus. The child recovered nicely.

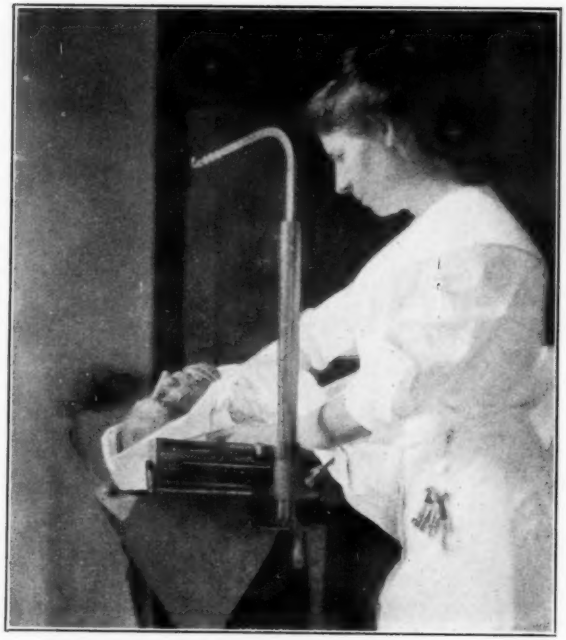
A young boy who received a blow on side of the neck suffered a fracture of the thyroid cartilage. I saw him some weeks after, with aphonia, dyspnea and a palpable fracture. Under suspension I was able to see a large granulation protruding into the larynx from the side of the fracture. Both cords were movable, but very red. I removed the granulation and placed an intubation tube in the larynx to fix the fractured plate. This was worn for about six days. Upon its removal the crepitus previously felt in the cartilage was gone and he breathed well.

Laryngology was born when Garcia discovered the laryngoscope, it bowed slowly to Kirstein when he saw directly into the larynx with his spatula, and it is now bowing again to our master of laryngology, Prof. Gustave Killian, when we are able to sit and view the larynx under suspension with both hands free to work.

While we all realize the infancy of the procedure, and are groping widely for its advantages and limitations, we cannot but think that the old must give way to the new method of attack, and I am certain that we will begin to change our

opinions, in proportion to the field of view and the possibility of its accomplishments.

I submit to you this, "A review of my efforts to place the apparatus, its principles and accomplishments, upon a firm foundation, a procedure established, true, but requiring much work yet to give it its proper status in our scientific attainment."



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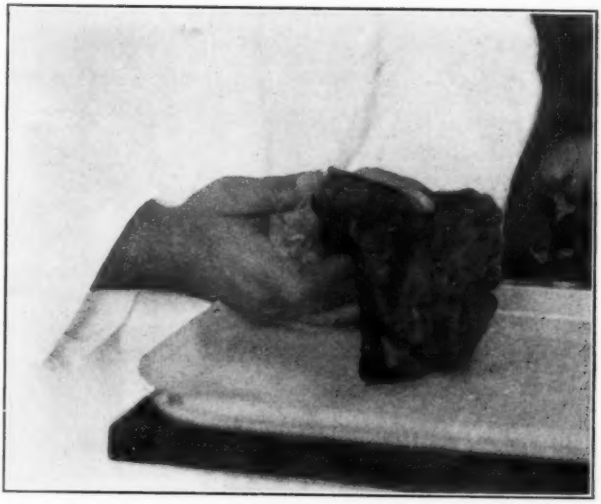

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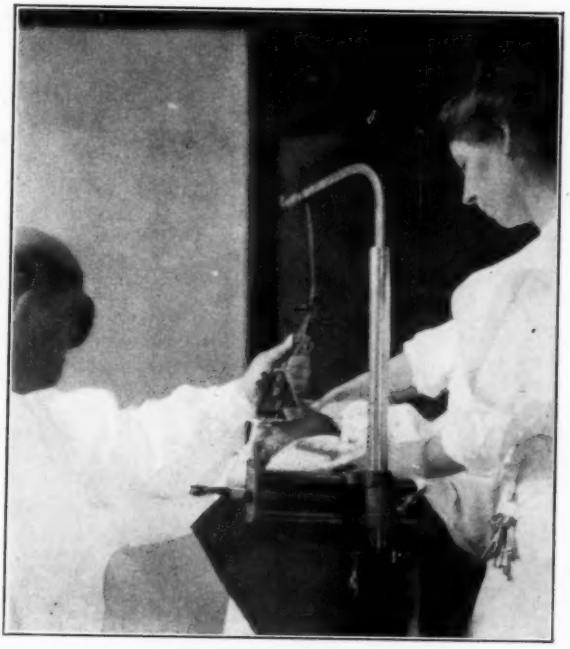

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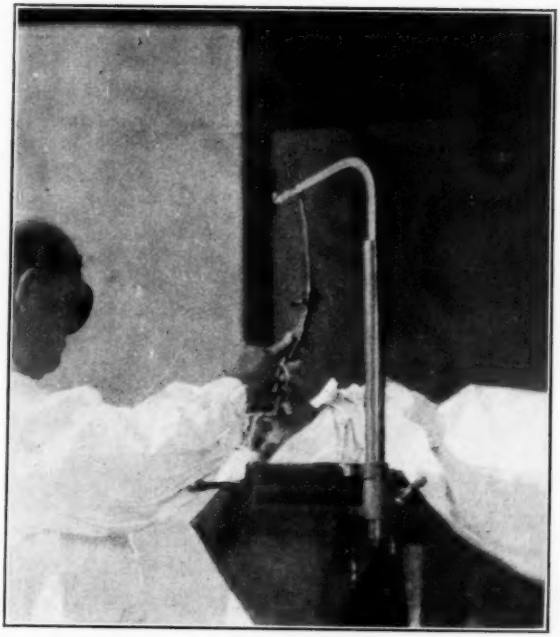

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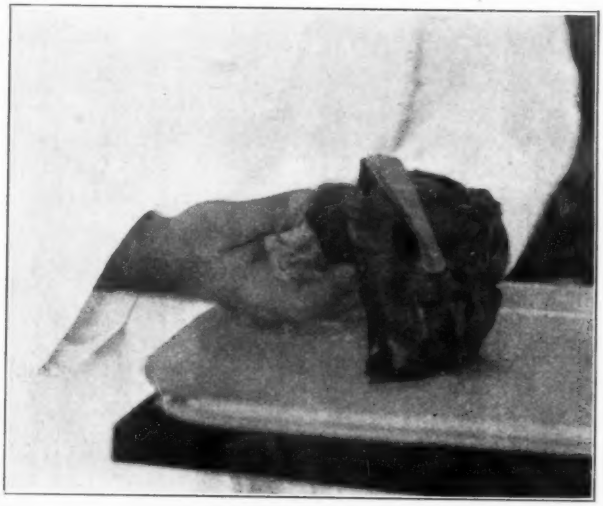

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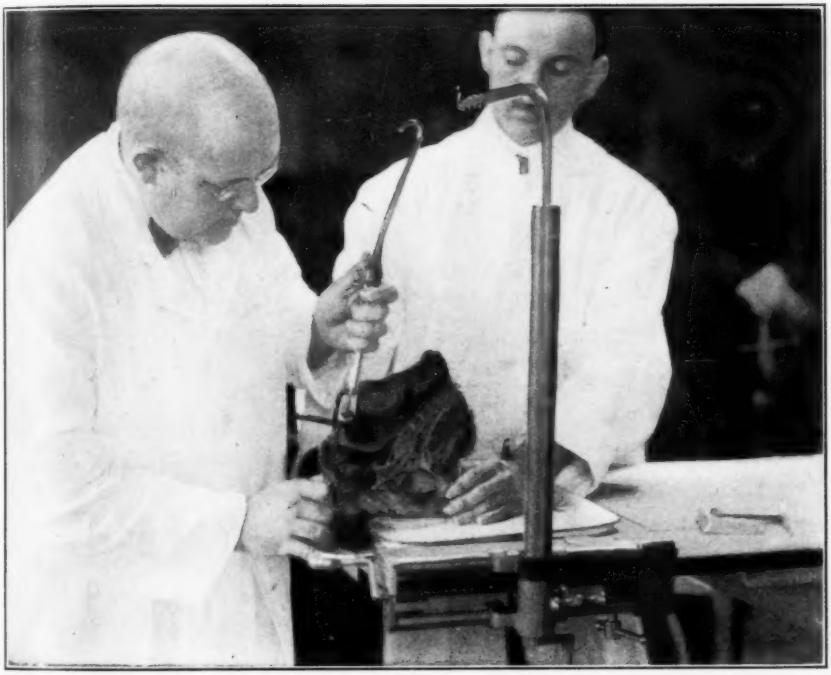

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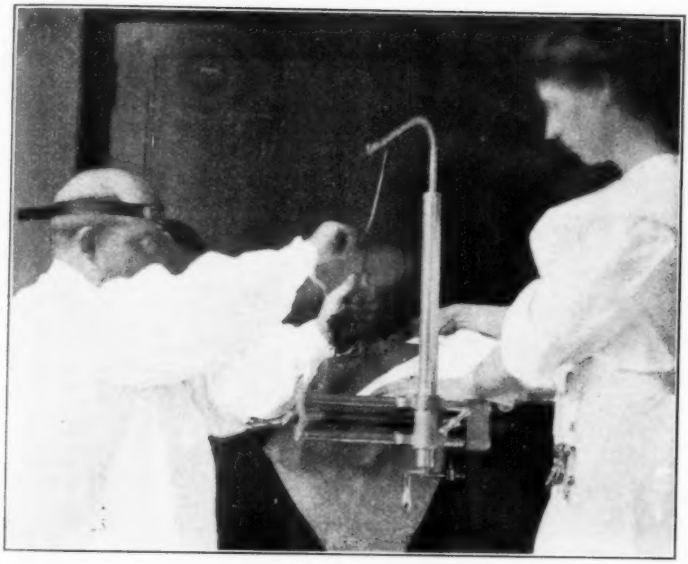

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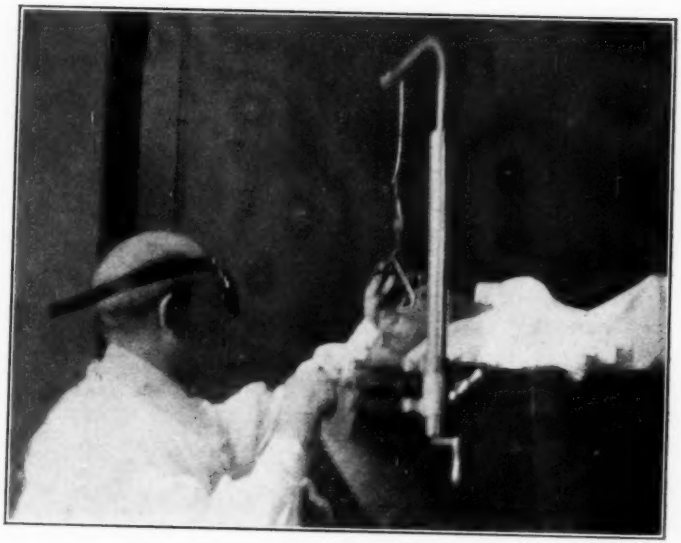

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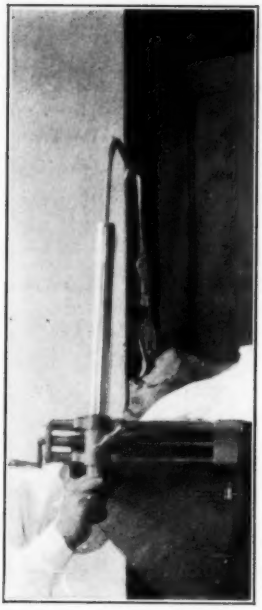

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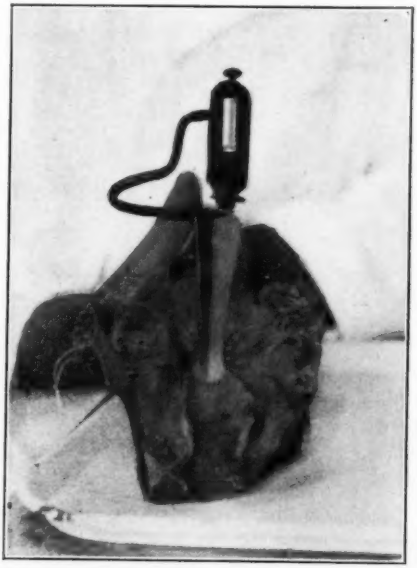

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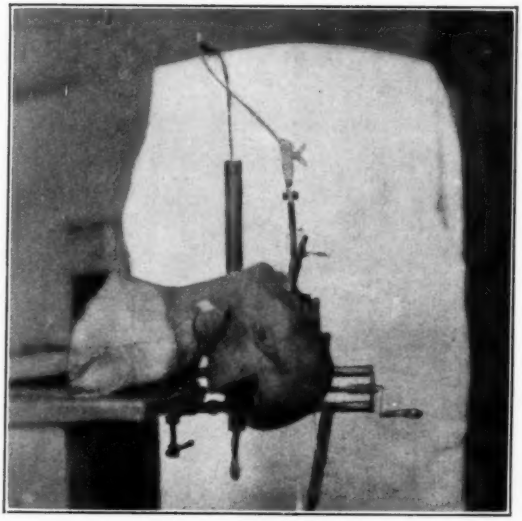

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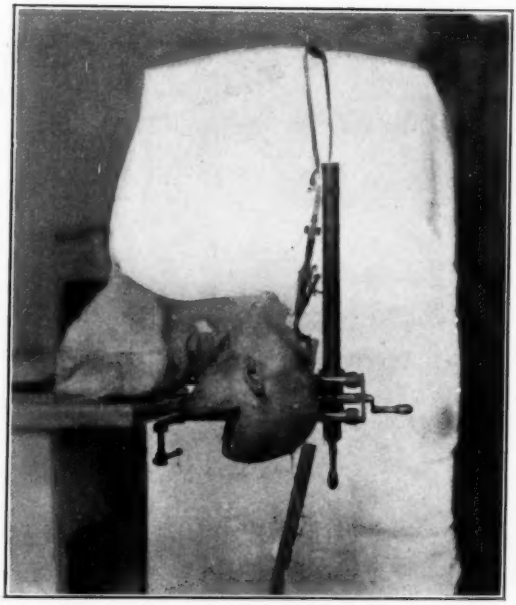

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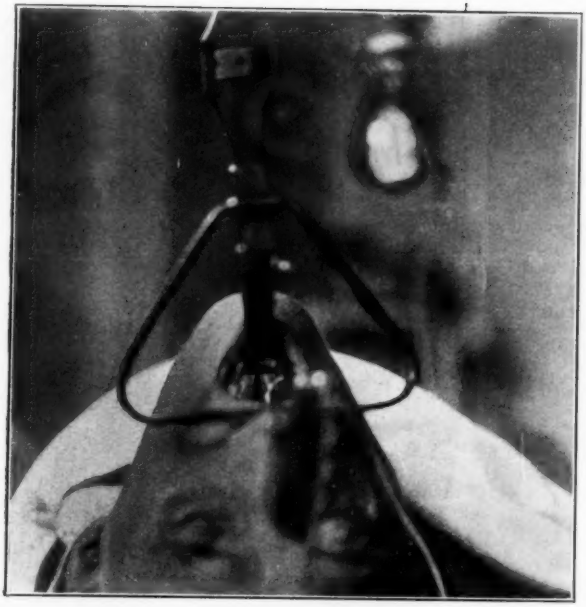

FIGURE 15.

FIGURE 16.

FIGURE 17.

XXIX.

FOCAL INFECTION IN THE ETIOLOGY OF LABYRINTH DISEASE.*

By George E. Shambaugh, M. D.,

Chicago.

In recent years a great deal has been done to clear up the various problems in the physiology of the internal ear. With this has come a better understanding of the symptoms arising from disturbance in function when the labyrinth is invaded by disease. We experience, as a rule, little difficulty in diagnosing cases of labyrinth disturbance and of reaching a more or less satisfactory conclusion regarding the probable nature of the pathologic changes which have taken place. The diseases of the labyrinth which we readily recognize include labyrinth involvement from suppurative disease of the middle ear or from meningitis; injury to the labyrinth, either through a fracture of the base of the skull or when operating on the middle ear; syphilis of the internal ear; otosclerosis with labyrinth involvement; degeneration in the labyrinth following long standing obstructive middle ear deafness, the degeneration in the labyrinth occasionally following the infectious fevers, as well as occupational deafness.

There remains a group of cases in which the labyrinth disease occurs in patients who have had no middle ear trouble and no general disease to account for the labyrinth involvement. In some of these cases the symptoms arise from disturbance limited to the cochlea; in others the symptoms are from involvement of the vestibular apparatus alone, while in many of the cases there is a disturbance of the whole labyrinth. The symptoms arising from the involvement of the cochlea are nerve deafness and usually tinnitus aurium. The deafness may be very insidious in its progress, in which case the tinnitus may be very slight or even quite absent. In many

*Read before the American Otological Society at its Forty-eighth Annual Meeting, at Niagara Falls, June 4, 1915.

of the cases the progress of the deafness takes place chiefly by acute exacerbations which occur as distinct apoplectiform attacks, and in these cases the tinnitus is always more marked immediately following each separate attack. In a few cases the first attack destroys permanently the function of hearing. The accompanying tinnitus aurium in such cases gradually diminishes, but often lasts for a period of years before entirely disappearing.

The symptoms arising from disturbance of the vestibular part of the labyrinth are those of disturbed equilibrium, the result of the imbalance occasioned by the partial or complete suppression of tonus from one labyrinth. This disturbance is always temporary and occurs as the sequel of an acute exacerbation of the vestibular involvement. In cases where the vestibular involvement is very insidious in its development the symptoms of disturbed equilibrium may be entirely absent.

The clinical picture from this group of labyrinth cases differs, therefore, very widely, depending upon whether the trouble is insidious in its development or whether it is punctuated by distinct apoplectiform attacks, and upon whether the disease involves both parts of the labyrinth or is restricted to either the cochlea or the vestibule. When the disease is associated with acute exacerbations involving the whole labyrinth, it gives rise to the group of symptoms which are commonly known as the Meniere symptom complex—that is, deafness, tinnitus and vertigo. When the disease involves both parts of the labyrinth, but progresses without acute exacerbations, the only symptoms are deafness and tinnitus.

It is in regard to the etiology of this group of labyrinth cases that I wish to call your attention. Meniere was the first to associate the attacks of vertigo, when combined with deafness and tinnitus, with disease of the internal ear. He believed that the disturbance was the result of hemorrhage in the labyrinth. That a hemorrhage into the labyrinth may produce this group of symptoms no one now will deny, but there are no grounds for believing that this is the actual pathologic change which takes place in these cases.

Some of these cases are called essential neuritis, others are designated as chronic progressive labyrinthine deafness, but there is nothing in either of these terms to suggest the cause of the changes going on in the internal ear. When we

seek to find analogies for these internal ear degenerations among diseased conditions found elsewhere in the body, we recognize at once the similarity between the phenomena observed in these labyrinth cases and the chronic degenerations which occur as the result of focal infection. Recent investigations have shown that chronic arthritis and neuritis, chronic cardiovascular degenerations and chronic nephritis are the result frequently of chronic latent foci of infection, the presence of which is often not suspected by the patient, since they often produce very slight or no local symptoms.

In all of these systemic diseases there is the chronic progressive character, punctuated, as a rule, from time to time by acute exacerbations, which are accounted for by a fresh shower of bacteria discharged from time to time into the circulation from the infected focus. These bacterial emboli lodge now in one part, now in another, through some as yet unknown predilection. Sometimes only one part, as a single joint, is involved; in other cases several structures are simultaneously affected.

To account for the phenomena observed in many of these cases of internal ear disease as the result of focal infection we have only to assume that the endings of the eighth nerve may be the structure peculiarly susceptible to the bacteria liberated from the infected focus. Each fresh shower of bacteria liberated into the circulation produces a sudden depression of function, either in the cochlear or vestibular nerve endings, separately or in both simultaneously. With each attack the patient experiences a defect in the hearing, associated with tinnitus aurium, when the cochlea alone is involved, or there is a disturbance of equilibrium with vertigo resulting from the one-sided suppression of labyrinth tonus when the vestibular apparatus is involved. When both the cochlear and vestibular endings are simultaneously affected, we have as a result the complete picture of the Meniere symptom complex—that is, deafness and tinnitus with vertigo.

A single attack may occasionally be severe enough to produce a total permanent suppression of function in the affected labyrinth. Here, in addition to the total deafness in the affected ear, there will be a severe tinnitus, which, diminishing gradually after the attack, may still require years before it entirely disappears. The vertigo occasioned by the sudden

complete unilateral suppression of labyrinth tonus will be very marked, but will also gradually disappear, rarely lasting more than a few weeks or months. In such cases, where the single attack causes a complete destruction of function in the affected labyrinth, there will, of course, be no subsequent attacks, unless the other ear should later become involved.

In most of the cases there is but a partial suppression of function resulting from a single attack. Here the deafness, as well as the tinnitus, are most marked immediately following the attack, but neither disappears entirely, as a rule, even after a long period. The vertigo usually disappears rather promptly after a few days or weeks. In these cases of partial suppression of labyrinth function there will very likely be subsequent attacks, provided the focus of infection persists. In some cases the attacks with the Meniere symptom complex persist at irregular intervals over several years, associated always with an increasing loss of function. The attacks may cease only after the function of the affected labyrinth has been completely destroyed.

With this conception that the internal ear may be the target for a systemic infection of focal origin, we have at once a plausible explanation not alone for the chronic progressive character of the degeneration going on in the labyrinth, but also for the apoplectiform attacks with which these degenerative changes are so prone to be punctuated.

The possibility that some of these labyrinth cases of unknown origin may be caused by focal infection cannot be denied. It behooves us, therefore, when examining these labyrinth cases of obscure origin, to make a careful search for foci of infection, just as we have learned to do in cases of rheumatism and allied conditions.

The focus for these systemic infections is usually found in the faucial tonsils or in abscesses around the teeth. When the tonsils contain the foci producing the systemic infection, there is very often a history of recurring attacks of acute tonsillitis. In some of the cases the patient will admit having recurring attacks of "sore throat," but denies ever having had attacks of tonsillitis. As a matter of fact, the recurring attacks of sore throat are usually mild attacks of tonsillitis, as can be readily determined by examining the pharynx during one of these attacks. It is, however, not uncommon to obtain

no history of sore throat, and yet a careful examination will disclose unmistakable evidence in the faucial tonsil of chronic infection. In some cases this evidence is the presence of pus, which can be expressed from the tonsil. In others the congested appearance of the tonsil indicates clearly the presence of an infection. Such tonsils may be enlarged, but often they are distinctly shrunken and smaller even than the normal tonsil.

When the focus of infection is located about the teeth, it not infrequently requires the use of the radiogram to discover the abscess.

Since this relation between foci of infection and disease of the internal ear suggested itself to me several years ago, I have had the opportunity of examining a large number of these cases of internal ear disease of obscure origin, and have already collected a number where the presence of such chronic foci of infection could be demonstrated, which our experience has shown to be capable of producing systemic infection. I will give briefly the history of three typical cases.

Case 1.—Mr. S., aged forty-four years, seen in April, 1912, because of a sore throat. Faucial tonsils had been operated on five years before. Large stubs had been left on both sides. Tonsil on left side congested. On pressure pus could be expressed. June, 1914, he consulted me because of a soreness in the left tonsil which had persisted after an acute tonsillitis a few weeks before. Pus expressed from the left tonsil showed pure culture of streptococcus viridens. Patient had an acute swollen joint in the forefinger of right hand. Ten days later had an attack of vertigo with nausea, which confined him to the house for several days, slight tinnitus aurium, but no defect in the hearing. Membrana tympani normal and no evidence of middle ear disease. Patient seen again in October, 1914. Had developed rheumatic soreness in several joints, including hands, neck and knees. Pus still found in left tonsil. Tonsil stubs enucleated November 7th. Pure culture streptococcus viridens grown from the tonsil. Following the operation the rheumatism disappeared for two months, when he began to have recurrence. The Roentgenogram disclosed a tooth abscess. The tooth was removed. Pus from the abscess gave pure culture of the streptococcus

viridens. The rheumatism disappeared promptly after the removal of the focus of infection under the tooth.

Case 2.—Mrs. L., aged fifty-three years, consulted me October, 1911, because of defective hearing. The trouble had developed suddenly three years previous in association with an acute peritonsillar abscess on the right side. She had experienced a sudden attack of deafness and tinnitus in the right ear, associated with vertigo and sensation of objects moving before the eyes. Examination showed drum membranes normal, and the functional tests disclosed complete deafness in the right ear with slight loss of hearing in the left.

Case 3.—Mrs. M., aged sixty-eight years, consulted me May, 1914, because of a very severe attack of the Meniere symptom complex, during which the vomiting had lasted for twenty-four hours. History of similar but lighter attacks for several years. Has been somewhat hard of hearing for a number of years. Has had chronic articular and muscular rheumatism for several years. History of recurring sore throat. Tonsils were small, but presented the congested appearance characteristic of tonsils the seat of chronic infection. Pus was expressed from the right tonsil. Both ears hard of hearing. Whisper not heard in left; heard in right about two feet; deafness of the labyrinth type.

XXX.

INFECTION OF THE EAR WITH VINCENT'S MICRO-ORGANISMS—REPORT OF SIXTEEN CASES.*

By J. A. Mulholland, M. D.,

New York City.

At a meeting of the nose and throat section in December, 1911, I had the privilege of reporting upon the aspects of this disease as observed in the wards of the New York Foundling Hospital. Twenty-four cases were then collected and certain observations with regard to the disease recorded. These were (1) the fact of its occurrence in debilitated children, (2) its apparent contagiousness, (3) its amenability to local treatment, and (4) its good prognosis.

Since then a number of articles have appeared which support the above observations and certain new data have been collected which will undoubtedly enable us to grapple more effectively with this disease. In looking over the literature, however, one is struck by the scarcity of case reports of this affection as observed in the ear. Only two papers and one textbook give it mention. The group of sixteen cases that I now present are, therefore, of considerable, if not unique, interest. Of these sixteen cases, thirteen were confined to the middle ear and meatus, and three had mastoiditis; two of the latter were considered inoperable and died from meningitis; both had complete facial paralysis. One case was operated upon and recovered. The two fatal cases were autopsied. On autopsy it was found that the whole middle ear and mastoid process were necrosed, nature having performed a complete radical operation. The lateral sinus and the dura of the middle fossa were extensively exposed.

It is worthy of note that these cases begin insidiously, without rise of temperature or complaint of pain, attention being called to the condition by the presence of discharge at the

*Read before the New York Academy of Medicine, Section on Otology, March 12, 1915.

meatus. The history in most instances was that of a chronic running ear lasting several months or years; diseased teeth, gums and tonsils were usually present, and the general physical condition of the children below par. On examination there is usually marked excoriation of the external auditory meatus and a profuse discharge of thick greenish pus having a foul and characteristic odor. The walls of the canal are covered with a dirty grayish membrane which, when removed, leaves a bleeding surface. The appearance of the drum membrane varies with the intensity of the inflammation and the stage of the disease. Perforations vary in size from a pin point to complete destruction, and in the severe cases the probe demonstrated bare bone in the middle ear and attic.

The mastoid cases showed considerable swelling and edema about the auricle, resembling, but rather more intense, that usually seen in subperiosteal abscess. On opening the mastoid the cortex was found to have almost completely disappeared, and the underlying cavity was filled with a spongy putrid mass containing some small sequestra of bone. The internal table was also absorbed, exposing the dura, and in the fatal cases the skin and subcutaneous tissue had become gangrenous. The appearance of the interior of the mastoid agrees perfectly with the description given by Yates of his case, and would appear to be typical of this infection.

The belief voiced in my previous report that the affection is at least mildly contagious is borne out by these later observations, nine of the sixteen cases coming from one ward, five from another, and two from a third.

The treatment raises several interesting questions which we hope to solve in the near future. The general treatment was symptomatic. Locally, irrigation with a 1/2,000 bichlorid solution at two hour intervals day and night was employed, with one swabbing daily of the external canal with a ten per cent trichloracetic acid solution. In the last four of our cases we dispensed with trichloracetic acid and substituted salvarsan locally, the powder being blown into the canal. Salvarsan was also given intravenously in these four cases, with remarkably satisfactory effects, all of the children recovering in from two days to two weeks.

The question has been raised as to whether salvarsan owes

its curative effect to its well known antagonistic action upon this class of parasites, or whether the disease was engrafted on a syphilitic basis. At least one case has been reported in which two Wassermann examinations were negative.

It is also interesting to note that Vincent's organisms are characteristic of noma, and it may be possible hereafter to save a number of these cases by the use of salvarsan, the present mortality being about seventy-five per cent.

Coplin, quoted by Amsden, says that "recent investigators are of the opinion that the various forms of spirochetæ and spirilla found in syphilis, Vincent's angina, and relapsing fever are not bacteria in the true sense of the term, but are animal parasites closely allied with the trypanosomes. If this be true, it would seem probable that a therapeutic agent having a curative action on a disease caused by one member of this group might have a similar action on other diseases caused by members of the same family, so to speak; hence, salvarsan has been recommended by Gerber and Rumpel in the treatment of Vincent's angina."

It appears also that our conception of the infection as a symbiosis of two distinct microorganisms will have to be revised and the more logical conclusion adopted that the affection is due to one polymorphous organism. Tunnicliffe finds that there are many intermediate forms between the typical bacillus and spirillum.

I will spare you a review of the literature on Vincent's angina. Several recent writers have summarized our knowledge with regard to the pathology and treatment of this disease, and you are doubtless familiar with these papers. I merely wish to repeat that as far as our observation goes the affection is apparently contagious, and when occurring among children in institutions the cases should be segregated. Salvarsan, whether used locally or intravenously, offers a distinct advance in treatment, and should be tried before operative treatment is instituted upon the ear, unless the mastoid is distinctly involved.

XXXI.

TRANSPLANTATION OF CARTILAGE IN THE CORRECTION OF SEPTAL DEFORMITIES.*

By Fielding O. Lewis, M. D.,

Philadelphia.

The nasal septum, almost unknown and seldom referred to until a comparatively few years ago, now occupies a most exalted position in rhinologic literature. The correction of its deformities, which may in some instances give rise to no symptoms, but in marked cases, with complete bilateral or unilateral nasal obstruction with its consequent mouth breathing, catarrh of the upper air passages, headache, sleeplessness, dry throat, and as an exciting cause of some of the reflex nasal neuroses, has been the means of marked development in the surgery of the nasal septum. After many surgeons had apparently endeavored to correct a deflected septum without sacrificing any mucous membrane, the submucous operation was very thoroughly elaborated by Killian, Freer, Ballenger, and others, until now it is perhaps the most frequently performed operation for the correction of a deviated septum.

The writer's interest was first attracted to the transplantation of cartilage about two years ago, after a submucous operation, during which both sides of the nasal mucous membrane were penetrated, and desiring especially to secure a good result with this patient, a piece of cartilage which had been removed was reintroduced at the point of perforation, with a most pleasing result.

The transplantation or reintroduction of the cartilaginous portion of the septum would seem a simple matter when it is considered that cartilage is a nonvascular structure, and in replacing it after its removal or transplanting it from one patient to another to its normal position and environment, it may naturally be expected to continue its life and function as

*Candidate's thesis, presented to the American Laryngological, Rhinological and Otological Society at Chicago, June 15-16, 1915.

a part of the nasal structure. While the researches of Tizzoni, Prudden and others have shown that cartilage freed of its perichondrium will in time become absorbed, and in its place fibrous tissue is formed, yet in the experience of the writer and others, the transplanted cartilage has remained for months and even years afterward. Goodale, of Boston, had a good result following the transplantation of cartilage in a nasal deformity. Green, of Boston, reports a case in which the transplantation of a portion of the quadrilateral cartilage from one patient to another was found to be absorbed two years later. In another similar case cited by the same author the cartilage was palpable some months following the operation. Another observer reports a case in which the transplantation of cartilage from a rib to the larynx was successful.

INDICATIONS.

The conditions for which the writer has found this procedure useful are: First, when perforation of the septum seems inevitable during the operation of submucous resection. Second, small perforation of the nasal septum regardless of cause. Third, deviation with displacement of the cartilaginous septum, which requires complete removal of the free end of the quadrilateral cartilage, as shown in Figure 1.

Since the operation of submucous resection has been evolved, a great many perforations of the septum have resulted. No matter how much care one may use in the performance of this operation, a sudden motion of the patient's head or a faulty move of the operator may cause his instrument to pierce both sides of the mucous membrane. Personally, I have found this to occur most frequently at a point opposite to the primary incision, for when both sides of the mucous membrane are not torn or injured, a perforation is not likely to occur. The writer has seen perforations of traumatic origin ranging from the size of a pin point to that of almost the complete destruction of the nasal septum, and it is a source of much annoyance to the surgeon as well as to the patient to have the patient return a short time afterward complaining of a whistling sound on respiration, a feeling of dryness in the nose, formation of crusts, and occasionally free epistaxis. To avoid these objectionable symptoms the following method has been successfully used:

In performing a submucous resection a portion of the quadrilateral cartilage which has been found necessary to remove is taken out in as large a piece as possible. This is washed and placed in sterile salt solution, and after the completion of the operation, if it is found that both sides of the mucous membrane have been penetrated or injured by removing pieces of bone, a piece of the cartilage is trimmed by means of scissors to the proper size and introduced between the two surfaces of mucous membrane. Both sides of the nostril are then packed tightly with gauze, being careful to see that the cartilage is in its proper position and the mucous membrane not curled upon itself. In about twelve hours the packing is carefully removed, and the patient is seen daily for a period of four or five days, in order that the position of the cartilage may not be altered and that the surfaces of the mucous membrane are kept clean, for when infection occurs the cartilage is very rapidly destroyed, which is seen to occur in abscess formation of the septum. Therefore, if infection is suspected, free drainage is necessary, and if instituted promptly the life of the cartilage is not altered. The patient should be instructed not to blow his nose, but to snuff the secretions through his mouth during this time. No washes or douches are prescribed. It will be found that the cartilage is easily retained in its position and the membranes heal rapidly, with gratifying results.

This method has been used by the writer in twelve cases, all of which have entirely healed with no signs of perforation remaining. In small perforations of the nasal septum of long standing, as shown in Figures 2 and 3, and especially in the long, narrow, slit-like perforations, which are frequently seen following a submucous resection, with symptoms as described above, the transplantation of cartilage has given excellent results, excepting in those cases where the perforation has been so large that the cartilage has been improperly nourished. In cases which belong to this classification the procedure has been as follows:

If the perforation is the result of the submucous resection, the two surfaces of mucous membrane are divided by means of a modified Freer septal elevator, as shown in Figure 5. The straight end of this instrument is used for separating the mucous membrane at the posterior surface of the perforation,

as shown in Figure 6, and the curved end of the same instrument is utilized at the anterior surface of the perforation, as shown in Figure 7. This should be done carefully, as the membranes are with difficulty separated, especially when some time has elapsed after the original operation was performed. A piece of cartilage previously removed from another patient is then inserted between the mucous membranes at the point of perforation, and both nostrils are packed as described above.

If the perforation is caused by a pathologic condition, the same instrument is used as shown in Figure 5 for elevating the mucous membrane around both sides of the perforation to the extent of about one-fourth of an inch, when possible, and a portion of the cartilage is removed between the surfaces of the mucous membrane, as shown in Figures 3 and 4. A piece of cartilage of sufficient size, which has been previously removed from another patient, is then introduced and the nostrils packed as described above.

It has been the desire of the writer to use this method of closure in old perforations which are larger, in conjunction with the flap operation which was described by Dr. M. A. Goldstein, but a proper case has not presented itself up to the presen time.

This operation has been performed by the writer on five cases, with complete closure in three cases, and the remaining two were failures, attributed to the large size of the perforation.

The third condition, illustrated in Figure 1, represents the type of cases in which the deviation and displacement of the quadrilateral cartilage is so marked that it produces nasal obstruction on both sides, as well as an external nasal deformity, and in order to properly correct this deformity and relieve the obstruction, it is usually necessary to remove the entire free end of the cartilage. This drawing represents a case which the writer first saw in January, 1914. The patient was a schoolboy, fourteen years of age, who had during childhood received a blow on the nose, causing a dislocation and multiple fracture of the quadrilateral cartilage, and since that time he was unable to breathe through his nose, with resulting mouth breathing, catarrhal condition of the upper respiratory tract and suppurative otitis. During July, 1914, under general anesthesia, the entire quadrilateral carti-

lage was removed by means of the submucous operation, and fearing that a flat nose might result, owing to the removal of the support, a large piece of quadrilateral cartilage which had been removed on the same day from a girl was introduced and treated in the manner mentioned above. At the present time, five months after the operation, the patient has good nasal respiration, the external deformity has been corrected, and the cartilage is palpable and in the proper position.

It is now the practice of the writer, in cases where it is found necessary to remove a large portion of the cartilage in order to allow proper breathing space, to properly treat and reintroduce the same, believing that in most cases the cartilage is not absorbed and continues to perform its function.

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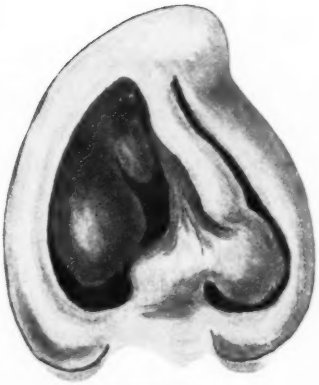

FIGURE 1.

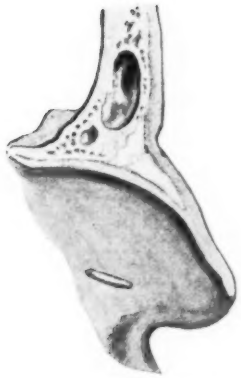

FIGURE 2.

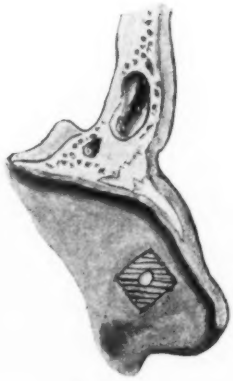

FIGURE 3.

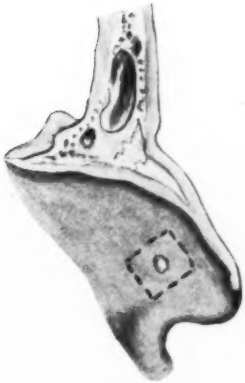

FIGURE 4.

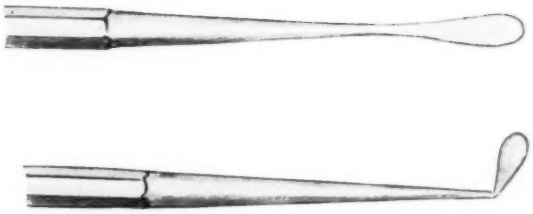

FIGURE 5.

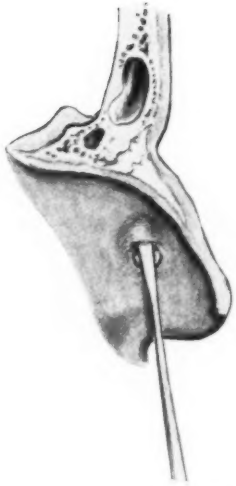

FIGURE 6.

FIGURE 7.

XXXII.

A REPORT OF SOME UNUSUAL CASES OF DISEASE OF THE NASAL ACCESSORY SINUSES.*

By John R. Winslow, M. D.,

Baltimore.

It has been my fortune during the past few years to have encountered a number of cases of nasal accessory sinus disease presenting such unusual characteristics that I have felt them to be worthy of your consideration and discussion.

Case 1.—A case of congenital membranous obstruction of both choanæ, complicated by unilateral endonasal atresia and double suppurative sphenoethmoiditis. Operation. Practical cure. Miss Emma S., aged twenty years, was referred to me by Dr. Wayland Frames, with the history of being unable to breathe through or blow the right nostril—she could inadequately breathe through and inefficiently blow the left nostril.

This condition was attributed by the patient to scarlatina, occurring at the age of ten years, but the underdevelopment of the choanal structures, later discovered, leads me to consider it congenital.

The patient was pale, thin and underdeveloped. She suffered from headache and her general health was poor. Sense of smell lost. Hearing normal. Said that she had been operated upon unsuccessfully by two surgeons.

Examination.—External nose small; complete atresia of the right naris from a point about one inch within the nostril to the choanæ, this being due to cicatricial adhesions from the floor to the attic of the nose, with the exception of a minute canal at the floor of pinhead caliber, extending to posterior nares. Floor of nose covered with albuminoid mucus.

Left naris obstructed by a deviated septum and bony spur at its middle third.

Examination with the postnasal mirror showed obstruction of both postnasal orifices by a diaphragm, the right one having a small perforation at its lower septal attachment, and the left one having two perforations, one about the middle along the septum and another just above it.

Operation.—December 12, 1912, from half past two to four o'clock in the afternoon. An injection of Schleich adrenalin solution was made into the cicatricial area at various points. Powdered cocain being applied along the turbinals, a probe was inserted into the pinhole fistula, followed by a probe pointed bistoury, which cut upward along the septum and choanal edge.

A dense synechia between the middle turbinal and the septum was severed with a rectangular knife, and the middle turbinal was resected with Sluder's knife and the snare. Upon removal of the middle turbinal a large gob (one-half ounce) of mucopus dropped upon the floor of the naris. Removal of the turbinal exposed an opening into a large cavity, the sphenoid, whose anterior wall was necrotic.

The ethmoid cells were exsected with Grünwald's forceps and the necrotic anterior sphenoid wall removed. Frontal sinus and antrum were not molested. The right choana was found to be undeveloped and could not be greatly enlarged.

The naris was packed with gauze strips for three or four days, and the patient then furnished with a long splint of gutta percha for daily insertion, after syringing the nostril.

On February 13, 1913, an attempt was made, under cocain anesthesia, to cut the two perforations of the left diaphragm into a single one, with a long probe pointed tenotome and biting forceps; at the same time the bony spur at the middle third of the septum was removed with Hajek's chisel. Dressed with a long rubber covered Simpson splint. The patient was kept under observation until March 12, 1914.

At this time she breathed well through the right naris and could blow the same. There was little discharge and that mainly in the morning. Her general health was greatly improved. She could inhale through the left nostril, but had difficulty in blowing it. The postrhinoscopic picture showed

a triangular opening at the lower septal side of the right choana.

By anterior rhinoscopy the movements of the pharynx could be seen through this.

On the left side was a single perforation about the middle of the membrane; the lower portion of the obstruction had not been removed.

The left side was not free, and the patient complained of suboccipital headache upon this side. Upon probing the anterior sphenoid wall felt carious and operation was advised.

On December 18, 1914, the patient was etherized and in the semirecumbent position the posterior half of the left inferior turbinal was removed with scissors and snare, and the middle turbinal with Sluder's knife and Grünwald's forceps.

Turbinal remnants and the posterior synechia were removed with the largest Grünwald, under the guidance of the finger inserted into the nasopharynx.

After completion of the operation the tip of the index finger could be inserted well into the left choana. An attempt was made to further enlarge the right orifice, but the bone was too dense to be cut. The left anterior sphenoid wall was carious and easily removed with sphenoid forceps.

A long rubber covered Simpson splint was used for twelve hours, and subsequently a cotton tipped applicator passed often enough to prevent closure of the opening.

Present Condition.—Following these operations, with the assistance of tonics, the patient improved greatly in her general health, and her weight, which had never exceeded ninety-five pounds, increased to one hundred and ten pounds; her appetite is good.

Her nasal breathing is excellent, and she can blow both nostrils satisfactorily. Headaches have disappeared. No pus is present in either nostril.

Both nostrils are free and the movements of the posterior pharyngeal wall can be seen through each side. The sphenoid openings are large and the interior of each sphenoid cavity can be inspected and probed.

The postrhinoscopic picture shows a moderate sized triangular opening to the septal side at the floor of the right choana, and a vertical ovoidal opening upon the left side, smaller than normal, but for all purposes adequate.

It seldom occurs to any one man to see many cases of congenital choanal obstruction. Some experienced observers have never seen a single case. The complications add to the rarity and interest of this case.

CASE 2.—A CASE OF MELANCHOLIC DEMENTIA DUE TO CHRONIC SPHENOETHMOIDITIS. CURED BY OPERATION. Mrs. Fred S., aged thirty-one years, married, one child, was first seen by me on February 10, 1907, complaining of inability to breathe through the right nostril. No discharge. Sense of smell lost.

Neuralgic pain at right temple and over right eye. No asthma. Left nostril at present clear, but she has had polypi removed from both nostrils. Whenever her nose becomes stopped she suffers from mental depression. Some years ago she lost her mind temporarily and was a resident of one of our insane hospitals. Duration of condition, seven years. At present she is sane, but peculiar and eccentric, with a coarse masculine voice. At times preceding her menses she exhibits epileptiform convulsions.

A polyp was removed from the right naris at this visit.

Patient was not seen again until February 26, 1908, when several polypi were removed from the right nostril, also in June, same year.

On December 17, 1909, she returned, complaining of severe headache, at times almost intolerable. Multiple small polypi were found in the left nasal attic and a medium size polyp in the right naris.

On December 21st an anterior ethmoidectomy was done on both sides with Luc's forceps, and the nasofrontal ducts probed.

Early in the operation the patient had an epileptiform convulsion and collapse, requiring the use of stimulation. The operation was completed (cocain anesthesia), when the patient became unconscious and remained so for several hours; pulse and general condition good. She then disappeared until May, 1913, when she returned, complaining of return of headache and mental depression.

Multiple polypi were found in both nostrils and a diagnosis of chronic sphenoethmoiditis was made.

May 12, 1913, multiple polypi were removed from both nos-

trils and the ethmoid cells exenterated with Grünwald's forceps and Worthington's curettes.

The anterior wall of both sphenoids was removed. The patient fainted many times during the operation, under local anesthesia, and at the termination became unconscious and remained so for two hours.

She was seen at intervals until Novemer 4, 1913. At this time she had had no headaches and her mental condition was normal. No polypi were present and both sphenoids were wide open and accessible to treatment.

Subsequently the patient left to take up her residence in Texas. The climate, however, did not agree with her, and she returned to Baltimore, and was seen by me on July 20, 1914. At this time I removed a large polyp from the right nostril and several small anterior polypi from the left. Both sphenoid fistulæ were wide open, exposing the interior of the sinuses.

The patient has been seen at irregular intervals since, and was last examined January 26, 1915.

She was in splendid general and local condition; looks and feels well; her voice is much softer and more feminine.

She is conscious of a change in herself and no longer feels and acts "queerly," as she formerly did. She rarely has fits of depression.

Although the influence of nasal conditions on the mental faculties was recognized by the ancients, I am convinced that cases of mental disease are at times classed as "incurable" without adequate examination of these regions.

Although an inmate of one of our best conducted institutions, as far as I can learn from a most careful inquiry, no examination of the nose by an expert was ever made or suggested in this case.

CASE 3.—A CASE OF SUPPURATIVE SPHENOETHMOIDITIS SIMULATING OZENA AND CAUSING MENTAL CONFUSION, IMPAIRED MEMORY, INTENSE HEADACHE AND BLURRED VISION. CURED BY OPERATION. Miss Rita T., aged twenty-four years, single, consulted me on January 17, 1912, with a discharging left ear, mastoid tip tenderness, but normal temperature. After a free myringotomy and under suction irrigation with Fowler's douche, the condition cleared up in eleven days without further

operation. During this attendance I learned the following history:

Patient had suffered for years from a loss of sense of smell, associated with a scabby discharge of foul odor, unless the nose was kept clean; this was told me by the patient and spoken of by her friends.

She suffered also from headaches of a mixed form, at times neuralgic in type, temporal and supraorbital in location, at other times dull and suboccipital, and again a combination of the two. These headaches had no relation to the menstrual periods.

When suffering from these attacks her vision was frequently blurred, and at times she exhibited a dazed mental confusion, so that she did not know in which direction to go. This syndrome she terms "spells." On one occasion she had manifested embarrassed respiration and loss of consciousness for about an hour.

Upon examination both nostrils were found to be filled with moist scabs; the left inferior and middle turbinates were atrophic. Upon aspiration, after cleansing, pus was seen exuding from the sphenoid, whose outer wall was covered with granulations. Probing caused pain similar to the suboccipital headache to which patient was subject. No ostium sphenoidale could be found. Creamy pus was seen trickling over the head of the left middle turbinal.

On March 13, 1912, under twenty per cent cocain, the left middle turbinal was removed with Luc's forceps, and granulations and bone curetted from the anterior sphenoid wall.

As no ostium could be found, further operation was postponed and the nose was packed with gauze strips. The patient endured the operation well and left the operating room in good condition.

Some fifteen minutes later she began to exhibit convulsive seizures of an epileptiform character.

This seizure being typical of others which followed later, I shall describe it somewhat in detail. The patient was unconscious with pupils widely dilated. Her forearms were contracted, fists tightly clenched and legs drawn up against the abdomen. She would continually thrash her arms about from side to side, striking herself or anyone within reach, unless restrained. At times the body would assume a condition of

opisthotonos. The respiratory movements increased in rapidity until a condition of apnea ensued. The patient would then hold her breath until one began to wonder whether she would ever breathe again.

A slow inspiration would then occur, followed by increasingly rapid breathing and a repetition of the cycle (Cheyne-Stokes).

During this time the pulse, though rapid, was good. This seizure lasted about five hours, was of a most alarming nature, and the convulsions could only be controlled by etherization. At the end of the attack the patient suddenly regained consciousness.

The nature of this seizure will be discussed later on.

March 14th the nasal packing was removed, and by March 26th all wounds had healed.

Treatment of the mucous membrane with a pigment of thigenol was begun, and the patient put upon Blaud's pills, fresh air and rest.

She was very nervous, with twitching muscles, and on one or two occasions had fainting spells. When seen on April 29th the nasal mucous membrane was much improved, presenting a small amount of clear mucus resembling syrup. She had had no suboccipital or severe headache. Was very nervous and went away for a two weeks' change. After her return she was seen and treated at varying intervals until December 11, 1912, when she reported that she had had no return of her "old headaches," her nerves were much better, and she no longer had "spells."

The nose was quite clean, contained no crusts and only a small amount of mucopus in the anterior ethmoid region. The patient was furnished with a nasal syringe douche for home use and treated at the office at increasing intervals until June 25, 1913.

At this time she stated that she had had a terrific suboccipital headache the preceding day, and on several occasions previously, sometimes in morning and sometimes in evening. By systematic probing I finally discovered the ostium sphenoidale situated high up and far around to the septal side of the anterior wall of the sphenoid. This was a very narrow opening leading into a large cavity, lying partly upon the

opposite side of the septum. The bone within the sinus felt and sounded bare.

Opening up of the sphenoid was advised, but deferred by the patient.

On September 16, 1913, she returned, complaining of dull headache on left side, mental depression, loss of memory and confusion in orientation. Operation was insisted upon and performed under local anesthesia, duration about three-quarters of an hour.

A large sphenoid sinus was opened up, and overlapping this to the outer side a large posterior ethmoid cell containing pus.

Convalescence was prolonged and attended with severe suboccipital headaches and general weakness. On October 22nd she reported that she had had no headaches for a week and felt fine. No mental confusion since the operation. Headaches became less frequent and severe and changed their type from suboccipital to vertical.

On January 28, 1914, she reported that she had been without headache of any kind for ten days.

On that day she had a slight dull pain on the left side of the head; this was relieved by cocain carbolic application within the sphenoid cavity.

On March 6th she complained of a severe hemicrania on the right side, which was relieved by cocainization of the right and left sphenoid (Sluder's method). Four days later a milder attack was benefited in the same way.

Shortly afterward the patient was seized with pain and swelling over the appendix and was confined to the house, but no operation was done. This appendicitis was probably secondary to the nasal suppuration. She has had no subsequent attack.

On May 23rd the patient reported that she had had no trouble at all for six weeks; had increased in weight and "felt better than she ever did in her life." Her looks confirmed this statement.

She reported again on July 13th with a recurrence of headache on the left side, which was found to be due to a protuberant mass of granulations which was removed from the sphenoid fistula.

On October 13th she reported that she had been having severe suboccipital headaches, mostly on the right side.

About one week previously she found that she could not use her left limb upon awakening, but this passed off during the day. She also told me that about one year before this she had a similar attack on the right side in a "movie parlor" and had to ride home in a taxicab. The first attack lasted for a period of six days, during which she was confined to bed.

At this period I had visions of a latent brain abscess. The alarming symptoms did not recur, and I insisted upon operation on the right naris.

This nostril presented the following conditions: Considerable sticky mucopurulent secretion from hyperplastic ethmoiditis, the hypertrophied middle turbinal being so tightly jammed against the septum that a fine probe could scarcely be forced between them. Under cocainization the probe could be passed into the right sphenoidal ostium.

A radical sphenoethmoid operation was done on November 3, 1914, by Mosher's method, under ether; time about one and one-quarter hours.

The ethmoids were somewhat sclerosed and shallow. The sphenoid was of medium size and the ostium higher up and farther to the ethmoid side than normal. This was enlarged by the usual method, and the left sphenoid fistula, which had somewhat closed, was reopened.

Ether anesthesia was employed under the idea that the convulsive seizure of the previous operation may have been due to cocain intoxication. Notwithstanding this, the usual epileptiform convulsions occurred, although by no means as severe nor of as long duration (about four and one-half hours).

These also could only be controlled by repeated etherization. As before, the Cheyne-Stokes respiration was exhibited. Shortly after the operation a hemorrhagic effusion occurred into both eyelids of the right eye, closing the eye and causing a black eye that lasted for some weeks.

At the first dressing on November 10th, a slight tendency toward convulsive movements was noted, but no further consequences ensued, and the patient left the hospital on the following day.

From this time she has progressed favorably, gaining

flesh and strength, assisted by tonics, and on January 28, 1915, stated that "she had never felt as well in her life."

Patient returned on February 5, 1915, complaining of a bad headache located at the posterior portion of the vertex.

There was no congestion nor swelling within the nose, and drainage was unimpaired. A one per cent carbolized oil instillation was made into each sphenoid cavity, and the headache disappeared the same evening.

She was not seen again until February 23rd, when she reported that she had had no trouble for two weeks and never felt as well in her life. There was little nasal secretion, the sphenoid fistulæ were wide open and the interior of these cavities looked dry and healthy.

Regular treatment was stopped at this time.

Six weeks later (about April 1st) patient reported that she had had no trouble until that day, when she had a slight headache.

An instillation of two per cent carbolized oil was made into the sphenoids, and the patient has not been heard from since.

Of course I am aware that the word cure cannot be employed in an absolute sense in a case of this kind, and that she will always have to devote attention to her nose herself and be kept under observation.

Aside from slight and occasional headaches, all serious symptoms have disappeared; her general and nervous condition is excellent; she has gained in weight, feels well and looks well.

Several interesting questions arise in connection with this case.

What was the nature of the impairment of motion of the legs, described by the patient as occurring on two distinct occasions?

In a person of her neurotic temperament, hysteria might well serve to explain this and subsequent nervous phenomena, and the short duration and spontaneous recovery without serious consequences, would seem to substantiate this view. And yet I must confess that I was much alarmed when I learned of these occurrences, and feared brain abscess or other grave cerebral conditions. Unfortunately, I was not summoned at the time and had no opportunity of observing the attacks.

Efforts to secure a neurologic consultation did not meet with the approval of the patient's parents, as the condition was so transitory and there were no ill after-effects.

What was the nature and significance of the epileptiform seizures following each operative manipulation? The first attack I was inclined to attribute to cocain intoxication (twenty per cent) and nervous excitability; but the pulse was good; there was no cyanosis, and there was no sweating nor clamminess of the skin. Moreover, a similar attack occurred under ether anesthesia. Observation of the seizures with the violent movements of the arms and legs, and opisthotonos, suggested hysteria, but she was unquestionably unconscious, and would have injured herself had these movements not been controlled.

In my opinion, hysteria does not account for all of these nervous phenomena; but there was some irritation of the higher centers of the brain and cord, originating in the nose and transmitted through the nasal branches of the fifth nerve.

Some suggestion of an epileptic inclination was afforded by the general tonic and clonic spasms, and loss of consciousness.

In this connection the "spells" manifested at times by the patient should be considered. These were attended with mental depression, impaired memory and mental daze, with and without headache.

Upon her visits I frequently noticed that the patient seemed in a condition of great nervous tension, manifesting spastic contraction of the arm and leg muscles, and at times the face. Could these manifestations be regarded as "epileptic equivalents" originating in the nose from reflex irritation or toxic absorption, and acting in the brain?

The headache in this case was of a complex type, and due partly to toxic absorption, partly to reflex irritation from pressure contact and pus retention, but largely to irritation of the sphenopalatine ganglion, as proven by the result of the local treatment.

Amblyopia was a part of the syndrome which she designated as "spells;" this existed only during the attacks, and in the intervals vision was normal.

This is one of the commonest of the many ocular compli-

cations of sinus disease, especially the posterior ethmoid and sphenoid sinuses. Its cause is not well understood, by some being attributed to pressure and reflex irritation, and by others to absorption of toxins.

CASE 4.—A CASE OF FRACTURE OF THE SKULL INVOLVING THE LEFT FRONTAL SINUS, ROOF OF ORBIT AND NASAL WALL, PRODUCING A SELF-PERFORMED KILLIAN OPERATION. EXPOSURE OF THE BRAIN. SUBSEQUENT INFECTION AND EMPYEMA OF THE FRONTAL SINUS, DRAINING THROUGH THE NOSE. OPERATION—CURE. James S., a colored man, aged thirty-four years, of rather low intelligence, was referred to me by my colleague, Dr. S. K. Merrick.

He had been admitted to the surgical department of the University Hospital on October 30, 1913, with the history that in the preceding June he had run into a post while playing "catcher" in the dusk.

This was followed by neuralgic pain in the head and pain in swallowing, which symptoms improved later on.

Upon entering the hospital he exhibited a swelling in the frontal region and marked edema of the eyelids of both eyes, especially the left. This had existed for about ten days.

Temperature and leucocytosis were normal. Also eye-grounds and pupillary reaction.

A radiogram taken at this time showed large unusually clearly defined frontal sinuses, with no evidence of the conditions subsequently found.

Noticing a foul odor and profuse purulent discharge from the nostrils, the case was transferred to the nose and throat department for treatment.

Examination of the nose at this time showed obstruction of both nares, the left naris being almost blocked above by a greatly deformed septum; probing discovered bare bone. Both nostrils contained moist scabs of a foul odor, and a profuse purulent discharge existed on the left side.

External frontal operation was determined upon, and performed under ether (vapor apparatus) on November 28, 1913, with the assistance of Prof. Merrick and Dr. Stem.

Owing to the great infiltration of the supraorbital tissues, I incised very slowly and carefully through these, and not encountering bony resistance at the usual depth, by the

use of the probe I discovered that the anterior sinus wall was missing; I also found the sinus cavity to be filled with granulations, and could not detect the bony resistance of the posterior wall. Very cautiously the mass of granulations was removed and the sinus cleaned and dried; it was then seen that the greater part of its posterior wall was destroyed and the cerebral dura exposed over an area as large as a twenty-five cent piece.

At the lower inner angle of the sinus a loose mass was detected, which with a little manipulation was extracted; this sequestrum measured about one and one-half by one-half inches, and upon study proved to consist of the left nasal process and a portion of the nasal bone, together with the inner portion of the lower orbital rim and floor. I also removed a loose piece of bone from the top of the nasal septum, and fragments from the floor of the frontal sinus.

After cleaning up the operative field, upon careful examination I observed at the upper inner angle of the sinus a gray convoluted area, which resembled and which proved to be anterior frontal convolutions. These were exposed over an area as large as the little fingernail and were denuded of dura mater.

This fact was substantiated at the time of operation by a general surgeon who was present, and subsequently during the dressing by another experienced general surgeon.

The operation was completed and the nasal wound closed, but the frontal was left wide open. Upon applying the dressings I remarked to my assistants and students that I did not expect the patient to survive forty-eight hours.

The following day he showed little effect from the operation, and in fact I was told that he had gotten up in the night and attempted to go to the toilet unassisted. The dressings were changed the following day and daily thereafter as long as necessary—subsequently at longer intervals—by myself or my interne, Dr. Stem.

For a time there was considerable swelling and soreness of the left forehead above the sinus region, and much pus could be stripped down by pressure. On two occasions

sequestra of considerable size worked their way slowly downward into the wound area and were removed.

No general symptoms of interest were manifested until December 19, 1913, when the temperature rose to one hundred and two degrees and cough developed, marking the onset of a bronchopneumonia, through which he was successfully piloted by my colleague, Prof. Zueblin.

The patient remained in the hospital and was dressed at suitable intervals until June 4, 1914.

The only noteworthy occurrence during this period was exposure to a case of smallpox, necessitating the quarantining of himself and the entire ward.

At the time of his dismissal the patient was going about doing odd jobs around the hospital.

The greater part of the wound had closed, and the skin of the forehead had been turned in and had covered over the exposed brain.

There was a slight mucous or mucopurulent discharge at the lower inner angle of the fistula.

The patient dressed this himself with a piece of gauze and adhesive plaster.

He also used an alkalin nasal douche with a syringe.

Having in mind an ultimate plastic operation, which I hesitated to perform at the time, and wishing to keep this case under observation, he was retained as orderly in one of the wards of the University Hospital. He was seen from time to time, and upon one examination I discovered an empyema of the left antrum and a right nasal sequestrum.

The frontal wound was in good shape and required little attention.

He was last seen early in April, 1915. I was preparing to correct the nasal and antral conditions, when for some infraction of discipline he was dismissed from his position.

This was nearly two years from the date of injury and one year and four months from the date of operation. Of this time (one hundred and eighty-four days) six months were spent in the hospital.

I am aware that there may be some question as to the origin and nature of the conditions present in this case. Personally I am convinced that a traumatic fracture of the frontal bone and both walls of the frontal sinus, associated

with fracture of the nasal process and orbit, occurred. Also of the nasal septum.

Subsequently the sinus became infected from the nose, setting up an empyema, which would have resulted in serious consequences but for the excellent drainage which was afforded by the accident.

I am led to this belief by the definite history of injury and the clean-cut appearance of the sequestra removed. Also the absence of a syphilitic causation, established by a negative Wassermann—not once, but on several examinations.

Another question which I would like to hear discussed is as to the proper line of conduct in a case of this kind. Granted that all sequestra had been removed and that suppuration had ceased, would it be good judgment and conduct to dissect up the skin and attempt to correct the deformity by a plastic operation, or would it be wiser to "play safe" and let it alone?

In conclusion, I hope that these case histories have proven of sufficient interest to justify their presentation and the use of the term "unusual" employed in the title of the paper.

XXXIII.

SURGICAL DISEASES OF THE SUPERIOR MAXILLA.*

By W. P. Barndollar, M. D.,

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The surgical diseases of the superior maxilla are quite within the province of rhinologists, and it is the object of this review to bring to their attention the various infections and neoplasms which may primarily be found either upon the surface of or within the maxilla, believing that they are not usually given that attention and consideration which their frequency and imperative early diagnosis entitles them. It has always been the custom to apportion the surgery of this region to the general surgeon, the rhinologist and the surgeon dentist; and it has been the complaint of the general surgeon for some years that these conditions of the superior maxilla, especially the malignant neoplasms, reach him when all hope of cure, by operative intervention, is past. Within the last few years the dentist has awakened to this state of affairs, and is not willing to allow any of these diseases which may come under his care to continue long without positive diagnosis. It is the opinion of the writer that rhinologists should not hold themselves responsible for antral and nasal conditions only, but should have a thorough working knowledge of the diseases to which this part of the body is subjected, and while it is not necessary for them to be absolutely familiar with their operative surgery, it is essential that they be familiar with and responsible for their diagnosis by their clinical symptoms, gross appearance, by section or incision.

From the rhinologic standpoint the diseases of the superior maxilla are: 1. Infections. 2. Neoplasms.

*Candidate's thesis, presented to the American Laryngological, Rhinological and Otological Society at Chicago, June 15-16, 1915.

I.—INFECTIONS.

The infections to which the superior maxilla may be subjected are those affecting the alveolar process and those of the maxillary sinus or antrum. The presence of the teeth, with their tendency to suppuration and necrosis, is responsible for the greater number of these infections of the alveolar process; but we must not forget that certain specific and toxic inflammations are likely to show unusual activity in this region.

Alveolar or Subperiosteal Abscess.—The portal of entrance for this infection is from the diseased tooth through the root canal to the periosteal lining of the tooth socket. This condition is of rapid development and easily recognized, as the tooth affected is sensitive, painful and slightly protruding, with a small localized abscess as the result.

Periostitis and osteomyelitis also result from tooth infection, though they may also result from the specific inflammations. They require incision, not only to establish their cure, but to establish, with certainty, differential diagnosis in those cases that the lesion may lead one to think of the more serious diseases which develop under similar conditions.

Necrotic Caries.—This condition is now known to be a tubercular one, usually engrafted upon a previous pyogenic infection. It may show as a swelling and later slow forming abscess, either below the infraorbital ridge or in the canine fossa. It must often be differentiated because of its slow development and tedious course.

Actinomycosis is a specific infection of the soft tissue and rarely involves the bone until its later stages. This is a rare condition, but it must be borne in mind and differentiated from the chronic abscesses or neoplasms which it has been known to simulate, by examination of the purulent discharge.

Syphilis may affect the alveolar process, either as a periostitis or gumma; this latter may be mistaken for a true neoplasm, and in all cases of doubt the test should be applied. It is only necessary to recall that unusual forms of both lead and phosphorus poisoning must be excluded in diagnosis of affections of the upper jaw.

Maxillary sinuitis is the commonest and most obstinate

of the infections of the superior maxilla. It is almost invariably secondary to or associated with diseases of adjacent structures, the acute inflammatory conditions of the nasal mucous membrane being the most frequent factor; infections about the roots of the teeth, that are found in close proximity to the antral floor, are another frequent cause and account for about twenty-five per cent of these infections (Skillern). Cryer says that, in his opinion, "more cases of diseases of the teeth occur as secondary to diseases of the antrum, than the reverse;" a point which we are likely to overlook, though consensus of opinion does not admit the likelihood of this statement. We have learned that necrosis of the teeth is directly responsible for antral infection much less frequently than was previously supposed (Luc, fifty-five per cent). Again, infection from other sinuses may gain entrance to the antrum, either through its normal ostium or abnormal openings. From the buccal cavity infection may enter through a fistula left by the removal of a tooth, the roots of which either pierced the antral floor or perforated it when it was drawn. I have had two such cases very recently.

The antrum is practically a closed cavity, lined with mucous membrane, and with bony walls of varying thickness; so that we have a cavity favorably formed to retain and nourish infection. The mucous lining is more of the endothelial type, hence has less resisting power, so that caries of the bone from its infection is a more frequent occurrence. As the antral cavity is rudimentary up until the sixth or seventh year, sinuitis is practically unknown in childhood. Maxillary sinuitis may be either acute or chronic.

Acute sinuitis produces a feeling of distention and pressure in the maxilla; sensitiveness to pressure in the canine fossa; pain usually continuous and severe, due, Cryer says, to the fact that the branches of the inferior dental nerves which cross the floor of the cavity are protected only by the mucous membrane lining the cavity, and hence exposed almost directly to both irritation and pressure; pus in the nasal cavity, often seen escaping from the normal ostium under the middle turbinate bone. These are characteristic of this infection, together with the general symptoms of pus absorption: chills, temperature, and

sometimes sweats. As in its acute stage sinuitis could scarcely be mistaken, it is, however, necessary to differentiate between the chronic form and some of the local conditions found in the superior maxilla.

Chronic sinuitis is usually the prolongation of the acute form. The pain is far less marked or even absent; the feeling of distention and pressure, however, still persist; constitutional symptoms are very slight or absent, yet the patient is much more likely to be mentally depressed and indefinite. Positive diagnosis may be made by puncture only; even in the hands of the experienced, considerable difficulty may be met with in diagnosing the presence of malignant growths and excluding the possibility that the antrum may be distended with pus and granulation tissue. Where the slightest doubt exists, incision through the canine fossa should be carried out and thorough inspection made. Glandular involvement is not present, nor is there ever bulging of the walls of the sinus. Sinuses do not form, nor does the diseased area grow progressively larger.

II.—NEOPLASMS.

In no other part of the body do we find new growths developing with such relative frequency or variety as in the superior maxilla. Not only do we see the usual types of malignant and benign growths which spring from epithelium, the connective tissue and the bone, but also a number of neoplasms of special characteristics, which develop directly or indirectly from the teeth. These latter are of great importance, both because of their frequency and in that they represent a large percentage of the neoplasms which may be cured by operative intervention.

Broca states that "the prognosis of tumors of the maxilla, at all times and in all forms, is far from good, and for this reason early diagnosis and differentiation is essential." I am, however, convinced that if this latter part of Broca's statement be observed, the prognosis of neoplasms of the maxilla need not be unfavorable. That carcinoma and the more malignant forms of sarcoma are not cured by operation, no matter how radical that procedure, is admitted; yet we know that these primary malignant growths are in the minority, and if the nonmalignant and less malignant tumors be early dif-

ferentiated, so that less radical surgery be practiced upon them, the number of operative cures will be and already has been increased and our prognosis of neoplasms of this region much more favorable. Bearing in mind that these new growths of the maxilla have the same general characteristics which distinguish them in other parts of the body, an effort will be made to include all of them which have been found, as well as to point out any special characteristics which they may exhibit in this particular situation.

It is usual to classify new growths as follows: Benign, when they grow by expansion and are encapsulated, or malignant, when they grow by infiltration. This would be an ideal working basis, if all of the neoplasms found in the maxilla could be definitely placed in one or other of these two classes. The rule that "malignant growths cause death, no matter in what situation they occur, and that benign ones may cause death, depending on their environments," is a well proven one. Yet in attempting to divide all neoplasms into these two groups, we find some new growths which are "borderline tumors," and others which we must class as both benign and malignant, depending on their type. Epulis, for instance, should be classed as a benign growth, and is, in its commoner form; yet the fibrosarcoma type is malignant. Neoplasms grow by the multiplication, through indirect division, of their own cells, not by the transformation or degeneration of these cells into tumor cells. They are independent, uncontrolled overgrowths of normal cells, though apparently possessing greater vitality. Tumors all tend to differentiate as do normal cell tissues. If the growth is rapid, as is seen in the malignant forms, this differentiation is not marked, but if the growth is slow, it is likely to be typical and sectional diagnosis comparatively easy. "The type cell is the one important element in every tumor, and from it the tumor should be named, not from some peculiarity of minor importance, such as method of growth, arrangement of cells or form of retrograde change" (Mallory).

The classification of Bland-Sutton—who presents it saying: . . . . "the study of the minute structures of tumors convinces us that they are composed of tissues normally existing in the body; pathologists realize that the structure of a tumor invariably corresponds with that of the tissue in which

it grew"—seems to me to be the most reasonable and the one best suited for this review of tumors of the superior maxilla.

1. Neoplasms of the Connective Tissue:
   - Chloroma.
   - Chondroma.
   - Endothelioma.
   - Epulis.
   - Fibroma.
   - Myeloma.
   - Osteoma.
   - Sarcoma.
2. Neoplasms of the teeth:
   - Odontoma.
3. Neoplasms of the epithelial tissues:
   - Carcinoma.
4. Cysts.

Chloroma is a diffuse hypertrophy of the alveolar border, occurring simultaneously in both upper and lower maxilla and extending uniformly in every direction. This is an exceedingly rare condition and has always been seen associated with lymphatic leukemia. It occurs as a diffuse overgrowth, apparently of the superficial tissue, in which the teeth may be completely or partially buried; does not markedly involve the bony structure and never the tissues of the face.

The differentiation of the neoplasm should give no difficulty, as the parent disease, leukemia, is always very evident with its remarkable increase in the circulating leucocytes, enlargement of the spleen, etc.

Chondroma.—This is another of the rarely found neoplasms of the superior maxilla. Composed of cartilage cells which spring from the periosteum of the canine fossa. They have been known to reach large size and are usually encapsulated. Clinically, chondroma cannot be differentiated from the chondrosarcoma, except in the two instances: that it is less likely to produce secondary deposits in other organs, especially the lungs, and that its rate of growth is likely to be much slower.

Endothelioma is a rare neoplasm originating from the endothelial cells of the inner walls of the veins or more rarely the lymph spaces. While these tumors are rare, they are said to occur by preference in the mucoperiosteum of the superior

and inferior maxilla (Bland-Sutton), but I have been unable to find reports of endothelioma in literature as occurring in this region.

They usually form nodules, rather soft in consistency, which do not grow to any size, and are prone to degeneration, though very little to infiltration, hence of not very malignant type. Clinically indistinguishable from epithelioma, in its early stages, especially when it occurs within the antrum.

Epulis is a connective tissue tumor arising from the periosteum of the alveolar process or from the connective tissue of the tooth in its socket. This growth is the least malignant of all forms of sarcoma, though it is of the pigmented variety and giant cell type.

Two forms of epulis are recognized: the myeloid or soft cell type, which is an inflammatory fibroma, and the fibroid, a true fibrosarcoma. In my own experience I have not seen the fibroid form in the superior maxilla, nor have I found reference to it in the investigation of writers on this subject, except that of Eve, who says that they do occur, and advises that microscopic differentiation be made in all cases, so that the surgeon may know how radically he may have to deal with this growth, since the myeloid or inflammatory form is distinctly benign and the fibroid is likely to recur. In this differentiation it is to be noted that the myeloid form springs from the cancellous tissue and has a homogeneous intercellular substance, containing within it some giant cells in small proportion; while the fibrous form shows a distinctly fibrillar matrix and is entirely made up of giant cells.

The myeloid epulis is a disease of early adult life and primarily is confined to the alveolar surface of the maxilla, appearing at the mucous margin of the tooth, or less frequently in the cavity left by the removal of a tooth. Its growth is slow and may be either in concentric or cauliflower form; covered with mucous membrane and without pain or tenderness. As it increases in size the epulis extends outward from the bone in all directions, but does not involve it, the color becoming a deep red, due to its great vascularity. Epulis is a curable growth. Most authorities recognize a marked tendency to recurrence, but my experience with their removal leads me to share, with Bloodgood, the belief that the occurrence is due to incomplete removal. Epulis does not

produce metastases or glandular involvement, unless secondary infection of the growth takes place. That an epulis is ever epitheliomatous is very doubtful. A microscopic study of nine cases has proven them all of the myeloid type.

Fibroma is one of the less frequent neoplasms of the superior maxilla; in this position it does, however, develop and may grow to large size. In the reports of some years back we find descriptions of unusually large tumors, particularly in the antrum, which are said to be fibromata.

This growth differs, in the maxilla, very little from fibroma in other parts of the body and is, particularly in physical characteristics, like fibroma of the uterus; being dense, hard, irregular or nodulated in surface, not given to metastases nor to the invasion of surrounding tissues, except by direct pressure in the line of its growth.

In this region we recognize two forms: the periosteal, from the alveolar process, and the endosteal, from the interior of the bone; the latter more frequently making its way through pressure necrosis into the antrum or the nasal cavity, where it often hangs remarkably free. Fibromata are of slow growth and are particularly disposed to calcareous or necrotic degeneration, though the latter occurs most frequently through mechanical irritation, such as puncture, section or efforts at removal. It does not involve either the skin or the lymphatic structures, and since it grows expansively it is not dangerous to life, except through its size, location or pressure which it may exert. The periosteal type, in its early growth, must be distinguished from the true epulis.

A case of unusual interest is that of a man of fifty years, who presented himself with a hard, dense mass, irregular in surface, covered with normal mucous membrane, upon the hard palate, extending from the canine tooth of the left side to the middle line of the hard palate. Section of this growth proved it a fibroma, and removal was effected with little difficulty. Six months later the external wall of the antrum was noted to be slightly bulging and the lower eyelid became edematous. The patient complained of no pain, showed no glandular involvement, nor any sign of recurrence at the seat of operation. The antrum was then opened and a fibroid mass exposed which occupied nearly the whole cavity and apparently sprang from the lower anterior wall and floor.

This was removed, and the alveolar process, together with part of the anterior wall and floor, were resected, with no recurrence to date (two and one-half years). This was a fibroma of evidently periosteal origin, with the growth into the antrum and roof of the mouth synchronous.

Myeloma develops from the cancellous tissue of the bone, showing on the alveolar border of the maxilla as a deep red, very vascular tumor, usually of small size. They are exceedingly rare in any part of the body, but are said to exhibit a marked tendency for the alveolar border of the maxilla. Here it cannot be differentiated clinically, though microscopically it is often typical. This growth is given to diffuse infiltration. though glandular involvement is not marked. It is a disease of the young, having been rarely seen after the twenty-first year.

Osteoma or ossifying periostitis is a bony new growth, and in the superior maxilla gives rise to a uniform swelling, with a broad base upon the alveolar surface, just above the tooth margin, due to the deposition of new bone tissue. Syphilis has always been thought to be the cause of these neoplasms, but their almost invariable coexistence with the pyorrhea alveolaris has led to the recent belief that the latter is the determining factor in this disease.

The mixed form, both cancellous and compact, is the osteoma most frequently found in the maxilla. They are, in themselves, benign and painless, unless they encroach upon nerve trunks in their growth; and while they never reach any great size, may cause considerable inconvenience because of their position. From a differential diagnosis standpoint they are important, as an osteoma might readily be mistaken for osteosarcoma. The former involves only the surface and is a new growth upon that surface, while the sarcoma is a neoplasm of the body of the bone, tending to growth in the direction of its surface.

That osteoma occurs on the antral surface of the maxilla is very doubtful. A few have been reported—some of them to have reached great size—but both Sutton and Broca believe that these antral growths are odontomes.

Sarcoma is, of the malignant neoplasms, the one most frequently found in the superior maxilla. In this situation it preserves the same characteristics which distinguish sarcoma in other parts of the body, though it is far more frequently seen

developing from the periosteal cells than from the medulla. All of the connective tissues contribute to this group of sarcomata, so we have:

(a) Fibrosarcoma.
(b) Myxosarcoma.
(c) Chondrosarcoma.

Fibrosarcoma originates in the same tissues as does the fibroma, but is more frequently seen than its prototype. It is distinctly a periosteal growth, and because the mass is made up of spindle shaped cells held together by heavy masses of fibrils, it is, perhaps, better known as the spindle cell sarcoma. It is characterized by its rapidity of growth; its tendency to infiltration of surrounding tissues; slight metastases by way of the blood stream and no apparent glandular involvement.

Myxosarcoma, of the three forms, is the one most frequently found in the superior maxilla, particularly within the antrum, where they are classed as the most malignant of the sarcomata. They may reach considerable size, are soft to the touch, and are rather paler in color than most new growths. Though usually encapsulated, it is given to the formation of finger-like projections which invade even the cheek. Glandular involvement has been noted, but it is always slight.

Chondrosarcoma is the least frequent and least malignant of the sarcomata of the upper maxilla. They arise from the periosteum as nodulated, encapsulated tumors, usually growing expansively without glandular involvement. Hard to the touch and mottled in color, due to the grouping of the mixed cells which go to make its mass. Chondrosarcoma of the maxilla is said to have a peculiar tendency to metastases of the lung tissues. Sarcoma in this region is most common between the ages of eighteen to twenty-eight years, differing from carcinoma, which is a disease of past middle age. All forms are characterized by rapidity of growth, a certain regularity of form, a tendency to the involvement of the whole structure by expansion of growth, the early appearance of pain and the lack of definite glandular involvement.

Odontoma is a neoplasm of dental origin, composed of the hypertrophied tooth elements, either in their germinating stage or from teeth still in the process of development, never from fully developed teeth. (Broca.) The three histologic

elements which enter into the formation of the teeth are, in this growth, found in various arrangements, containing spaces in which are found fragments of tooth structure or an imperfectly developed tooth or teeth.

Two distinct types are recognized: the follicular, and the adamantinoma. Follicular odontoma usually develop from the molar teeth, and is sometimes known as a dentigerous cyst, though in this classification we do not recognize them as true cysts. It occurs as a small mass within the alveolar process with fibrous walls, which tend to calcification. The adamantinoma (composite) occurs as a new growth composed chiefly of the cementum and enamel forming epithelial cells, hence exceedingly hard, in branching masses. This latter form is particularly likely to invade the antrum.

The history of all odontomata is of interest, in that they may and usually do remain quiescent for years, then suddenly begin to grow, inducing irregular neuralgic attacks and, as they increase in size, mild constitutional symptoms of peculiar range. I have recently seen two cases of odontoma of the superior maxillary, one a man aged twenty-six years, the other a lady of forty years, in whom neuralgia of very severe type and slight swelling of the alveolar process just above the tooth margin were the only symptoms. Both have been completely relieved of this pain by the removal of the neoplasms.

Odontoma grows by expansion, and very slowly, though they may reach considerable size and destroy much tissue by pressure. Does not give rise to metastases or glandular involvement; so is benign. The bone-like swelling, however, is not characteristic, and because of its frequency, all neoplasms of the maxilla from which we cannot absolutely exclude the odontomata should either be explored or have X-ray pictures made; the growth is usually shown characteristically by the latter.

Carcinoma occurs as a primary neoplasm of the superior maxilla less frequently than as a secondary new growth, yet it ranks next to the sarcomata as being third among the primary tumors of this region. It is an epithelial overgrowth, and hence may spring from either the alveolar surface or the surface of the antrum and nasal plates, therefore, we recognize two forms: the squamous, from the squamous cells of the buccal surface, and the tubular, from the antral and nasal

mucous membrane. Of these two forms, that from the squamous is far the more frequent.

The squamous type (epithelioma) is primarily a small, circular ulcer with irregular raised edges, or more rarely as a small fungus-like growth upon the alveolar mucous; in either case the indurated edges are characteristic. It is very slow of growth at first, but progresses very rapidly when once its growth is established, due to the fact that at first the cell nutrition is limited; when they reach into the larger lymph spaces and begin infiltration of the capillaries of the submucous connective tissue, their growth becomes rapid. Infiltrating irregularly and rapidly, it destroys the normal mucous membrane, the teeth, the bone substance and finally the skin. Secondary infection of this mass of growing cells and detritus takes place early, and we find a foul, fetid, semifluid discharge thrown off. It is usually at about this time that the pain begins, growing progressively more severe.

The tubular form is an extremely insidious disease, as its primary lesion is within the antral cavity and usually does not make its presence known. The first symptom of its presence is pain in the region below the orbit, a brawniness of the cheek, followed by edema of the tissues of the cheek.

Antral carcinoma is characterized by its soft consistency and exceedingly rapid growth; this latter well illustrated by the following case: A perfectly healthy looking man, aged forty-eight years, presented himself at the hospital dispensary for the relief of epistaxis. Examination showed a new growth of small size, apparently from the antrum, and section was taken for examination, proving it a carcinoma of the tubular type. Patient did not return, however, for three weeks, when second examination disclosed the left lower fossa of the nose completely filled with the growth, as well as most of the lower antral space. He was admitted to hospital, though past operative intervention, and died in six weeks. Histologically it is marked by the fact that infiltration is so gradual that it is impossible to determine where the growth ends and normal tissue begins. This way of infiltration has earned for it the title of "boring cancer."

Carcinoma is distinctly a neoplasm of middle life, scarcely ever occurring before the forty-fifth year. Is painless in its early stages, but later pain is very severe. Metastasis is fre-

quent and glandular involvement constant. Irregular, rapid infiltration into all surrounding tissues is its growth, with ulceration, liquefaction and sloughing resulting from the mass occluding its own blood supply and the constant presence of septic infection.

Cysts of the superior maxillary bone are among the most common of its surgical affections. They develop from the root of a permanent tooth, by the growth of the tooth sack with its contained fluid, the remains of the enamel forming organ. As these tumors may develop long after the tooth has been removed, it is not always possible to establish direct connection between one of these cysts and a particular tooth, but smaller cysts have often been accidentally found directly attached to the tooth root, and as the histology of both are identical, it may safely be assumed that their origin is the same. Buchtmann's theory, that these tumors develop from the ingrowth of buccal mucous membrane along the root of carious teeth, though accepted by many, does not seem to explain their complicated formation so well as that of their development from the epithelial layer of the sheath of Hertwig. These cysts, like the odontomata, may remain within the bone quiescent for years, to be suddenly stimulated to proliferation and tumor formation. Until lately these cysts, especially the multilocular form, were supposed to occur but rarely in the superior maxilla; a fact that Becker explains by the statement that these neoplasms early invade the antrum, where their true nature is less easily recognized, slowly replacing the bone by absorption and pressure, the cyst reaches the surface of the bone, where the external layer may become so thinned as to give a parchment-like crackle on palpation; in most cases, however, the cyst wall, of connective tissue with its epithelial lining, is so heavy that this cannot be noted. Eventually this external layer of bone will be destroyed and there appears on the surface a uniform, painless swelling, with well defined margins, bluish in color and fluctuating with difficulty. Incision of the tumor will release a quantity of fluid and disclose a cavity heavily lined with a membranous wall, into which no tooth elements or bone project.

Of those that invade the antrum, few are recognized in life, though many are found at autopsy. The well known

mucocele of the antrum is in most instances an unrecognized maxillary cyst. In this location the developing cyst produces little pressure, hence no pain; and so the patient's attention is not called to its existence until it reaches the surface, where it may show as a cyst swelling over the antrum directly opposite the ala of the nose, or more rarely it may force inward the lateral wall of the nose toward the septum. This bowing-in of the antral wall is a distinguishing point between the cyst and the maxillary sinuitis.

Cysts of the maxilla are most common about the age of thirty, though several have been reported as occurring in childhood, from the developing permanent teeth. Among my own cases, three have developed during pregnancy, and although unnoticed up to that time, grew with such unusual rapidity that they had to be surgically treated during that period.

The mucous membrane over the exposed surface of these growths does not tend to ulceration, nor are there any inflammatory symptoms, except where infection has been secondarily induced by incision or puncture. These neoplasms show exceedingly well in X-ray photographs, while incision is absolutely diagnostic.

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XXXIV.

TRUE MYXOMA OF THE RHINOPHARYNX—REPORT OF TWO CASES.*

By Virginius Dabney, M. D.,

Washington.

It is because of the extreme rarity of a pure myxoma in the rhinopharynx that these cases are reported; indeed, such a tumor is infrequent anywhere in the body, but especially in the postnasal space, where the invasion of fibrous elements in new growths seems the rule. In fact, Adami speaks of the myxomata as tumors composed "in the main" of isolated cells of a stellate or polyhedral appearance, generally showing condensed fibrous tissue or cartilaginous masses. It is the occurrence of these fibrous elements that has led many pathologists to reject the classification of true myxoma, and they speak of myxomatous modification or degeneration of a connective tissue neoplasm. Such differentiation is quite proper and scientifically accurate, but only where this fibrous or cartilaginous constituent is demonstrable. The accompanying sections show that no such element is present in the cases reported, as the capsule is the only fibrous appearance there, and it does not send in any trabeculæ. Unfortunately, only one of the cases furnished sections for photographing, as the patient destroyed the neoplasm after examination, but before the pictures could be made. It was identical in structure with the other, however.

Case 1.—R. G., aged twelve years, healthy girl, daughter of healthy parents, had felt some difficulty in nasal respiration for about two months, and was sure she had never had such difficulty before that time. There was nothing abnormal in the mouth, nose or hypopharynx, but on drawing forward the soft palate, there was seen plainly resting upon it a smooth,

*Read before the American Laryngological Association, June 1, 1915

grayish tumor, freely movable. Under ether, digital examination showed it to be attached firmly by a broad base to the basilar process, whence it resisted removal by all the usual instruments, unless I was to be content to remove it in part. Finally, a soft rubber catheter was passed into each nostril, the two ends drawn snugly anteriorly and clamped at the nasolabial margin. Thus the growth was straddled, and isolated for manipulation, and the palate drawn forward all at the same time, while the field was absolutely clear of instruments and the hands of any assistant. A large adenoid curette was fitted into the space between the catheters, held firmly there, the beak against the vomer, till the vault was reached, when a sweeping posterior movement removed the mass in toto. It proved to be nearly round, and an inch and three-quarters in diameter. It was a pure myxoma, which is especially remarkable, as the patient was at the age when such neoplasms are prone to fibrous change, even malignant transformation; yet there was no such manifestation. While it does not prove that no recurrence will take place, it is well to state that none has as yet occurred after an interval of ten months.

Case 2.—M. F., aged nineteen years, pale, neurotic girl, thought it a year since she first noticed a stoppage of the nose and an irritative cough. Her lungs were normal, and there was no syphilitic or tubercular history to be obtained. While two growths were afterwards found at operation, only one at this time was visible with the mirror, but this was easily seen. The inferior extremity, only on attempted nasal inspiration, rested on the soft palate. She declined to have any operation without a general anesthetic, which was accordingly given and two tumors made out by digital examination: one attached to the basilar process, smaller of the two, heart-shaped, approximately one inch in each direction; the other, clearly felt, was attached to the posterior ethmoid region on the left, two and one-half inches long, three-fourths of an inch broad. Both were divulsed with a large pair of adenoid forceps, apparently without leaving any remains. Apart from the fact of the two tumors being excellent specimens of true myxomata, additional interest is lent to the absence of any fibrous structure by the history of another growth, described by the patient as identical, which was removed eleven years before. That she should have had no recurrence of some tumor showing a con-

nective tissue origin, and that the two which did return, for they must have been recurrences, likewise showed a pure myxomatous structure, is, I think, worthy of record, especially, as remarked of the previous case, because the tumor formation covered a period in which tissue change is usually marked, that of puberty and early adolescence. It is too early to make any prediction as to recurrence, inasmuch as the removal was accomplished only five months ago.

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FIGURE 1.

Magnified 257 times.

FIGURE 2.

Magnified 60 times.

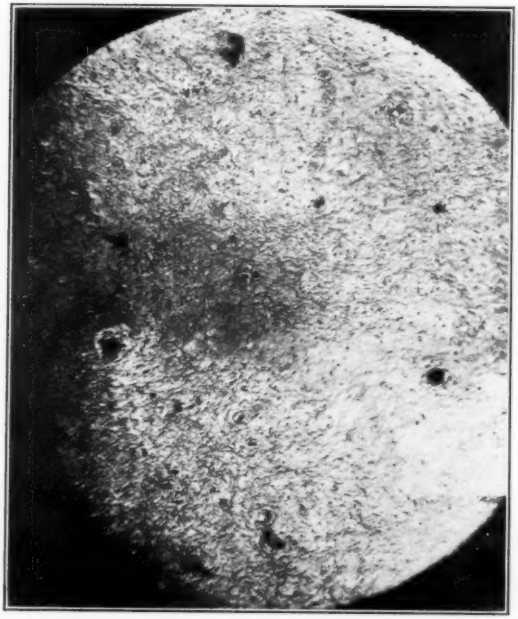

FIGURE 3.

Magnified 60 times.

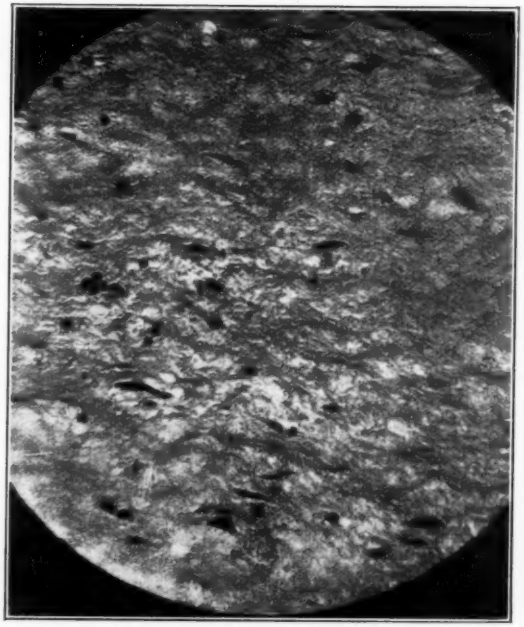

FIGURE 4.

Magnified 257 times.

FIGURE 5.

Reproduction a little smaller than life.

XXXV.

REPORT OF TWO CASES OF MASTOID ABSCESS, INFECTIVE THROMBOSIS OF THE LATERAL SINUS AND JUGULAR VEIN—RESECTION OF THE JUGULAR—RECOVERY.*

By J. H. Bryan, M. D.,

Washington.

While the first case was rather typical in character, it nevertheless presents some unusual features which justify its being placed on record. Case two, on the other hand, presents many difficulties, and is brought before the society with the hope that the discussion will bring out some suggestions as to the best manner to manage those cases where the infected clot remains in the bulb, as in this case, where one time it seemed almost impossible to dislodge it without the radical destruction of the bone through which the lateral sinus passes into the neck. I believe it was the presence of this clot which was the source of the continued systemic infection.

Case 1.—Acute suppurating mastoiditis, perisinus abscess, infective thrombosis of the lateral sinus and jugular vein; resection of the jugular; streptococcus infection.

I saw this case, a girl thirteen years of age, on the evening of January 25, 1914. She had been ill for two days with a marked attack of influenza. The ear became almost immediately involved, accompanied by intense pain, and the membrane ruptured spontaneously during the course of the first twenty-four hours. When I first saw her she looked ill, the temperature was 104°, the left ear was discharging profusely—pus mixed with blood. She was complaining of intense pain in the ear, and there was marked tenderness over the mastoid tip.

Examination of the ear showed an intensely inflamed membrane with a perforation in the lower posterior quadrant, through which a bloody purulent secretion was flowing freely.

*Read before the American Otological Society at its Forty-eighth Annual Meeting, at Niagara Falls, June 4, 1915.

Hot boracic acid irrigations were ordered hourly during the night.

January 25th. The patient was removed to the Episcopal Eye, Ear and Throat Hospital at ten o'clock this morning. On admission her temperature was 103.4°; at noon, 104.4°; dropping slowly to 102.8° at 8 p. m. As the child was attending a boarding school in Washington, and her parents were living some distance from the city, there was some delay in reaching them to obtain their permission for an operation.

January 26th. Today the temperature ranged from 102° to 103°. While the pain in the ear was greatly relieved by the hot douches, she was extremely restless and dull.

January 27th. At 8 a. m. temperature was 99.8°. At 10 a. m. she had a severe chill, following which her temperature advanced to 105°. Permission for an operation having been obtained, a simple mastoid operation was done at 2 p. m. After opening the mastoid it was found to be already very badly affected and the antrum filled with pus. The whole of the outer wall was removed down to and including the tip of the process, and everything in the way of diseased bone was thoroughly removed with the curette. The sinus wall was exposed, carefully examined, and found to be in good condition, and as there was no reason to suspect sinus infection, it was not opened. The wound was dressed in the usual manner and the patient returned to her room. The temperature after the operation, at 4 and at 8 p. m. was 102°.

January 28th. The patient this morning had a very septic appearance. Temperature at 8 a. m., 103°; at 12 noon, 99.4°. She had a severe chill about this time, and the temperature rose to 103.2° at 4 p. m.

January 29th. At 8 a. m., temperature 104.2°; at 12 noon, 104.2°. Owing to the continuous high temperature, it was decided to explore the wound farther. In consultation with Dr. C. W. Richardson, who assisted me in the operation, the dressings were removed and the mastoid wound was found to be in a healthy condition. The wall of the lateral sinus was completely removed from the knee to the bulb. At the latter point a large perisinus abscess was located. After thoroughly removing the pus and some granulations the sinus itself was opened to its full extent from the knee to the bulb and found filled with a firm clot. This was removed with the

curette as far as the knee and well back toward the torcular, when a sharp flow of blood followed which was controlled by compression. The curette was then passed down toward the bulb, and as there was no return flow of blood from this end of the vein, we decided to remove the jugular. After packing the upper end of the lateral sinus with an iodoform gauze plug, an incision was made along the anterior border of the sternomastoid muscle, extending from just below the mastoid tip to near the clavicle. The vein, exposed, was found to present a firm, cord-like feeling. After ligating the vein at its upper and lower ends, its collateral branches were then ligated, and about two and one-half inches of the jugular were removed. A gauze drain was then placed in the upper and lower ends of the wound, which was closed by means of interrupted sutures. The mastoid dressings were then applied and both wounds enveloped in a bandage. The patient reacted well after operation. The temperature at 4 p. m. was 101.4°. The pathologist reported he found streptococci in the clots removed from the lateral sinus and the jugular vein.

January 31st. The patient since the operation has been doing well, although the temperature is markedly septic in character, and ranges from 99.2° to 104.2°. The mastoid and neck wounds were dressed today and found in good condition. The gauze compress at the upper end of the lateral sinus was not removed, but the gauze wicks in the upper and lower ends of the neck wound were removed, and some pus was found in the upper end of the wound, which was removed by gentle irrigation. The gauze drains were reinserted in the neck wound and the mastoid dressings reapplied.

February 1st. The patient seemed much better during the early part of the day, but at 4 p. m. she had a severe chill, followed by a rapid rise of temperature to 104.2°. She was given ten cubic centimeters of antistreptococcus serum in the lumbar region. Following the injection the temperature became lower, ranging from 98° to 100.4° during the two following days; but owing to the continued high leucocyte count she was given a second injection of ten cubic centimeters of antistreptococcus serum on the afternoon of February 2d.

February 3d. Wounds redressed. Mastoid wound looking healthy. Gauze compress removed from the upper end of

the lateral sinus, and as no blood followed its removal it was not renewed. Pus found in the upper and lower ends of the neck wound after the removal of the drains. Both ends irrigated with a saturated solution of boric acid. Firm union of the edges of the wound having taken place, the stitches were removed, the gauze drains reinserted, and the mastoid dressings reapplied. The temperature during the night of the 3d and the forenoon of the 4th ranged from 102° to 102.2°. On the afternoon of the 4th she was given twenty cubic centimeters of the serum, and following this last injection her temperature dropped to 99.2°. From this time on the temperature became normal and remained so during the rest of her convalescence. The wounds, both the mastoid and that in the neck, progressed favorably, and she was soon placed on the convalescent list. The scar in the neck for a long time remained quite insignificant, but about two months after leaving the hospital it presented quite a broad, ribbon-like appearance and was very red. I am glad to say, however, that within the last six months this has disappeared and the scar is insignificant. The following is a tabulated statement of the blood counts and bacteriologic examination:

January 25th, on admission to the hospital, leucocytes, 14,400; aural pus smears showed the presence of many cocci, mostly in pairs like pneumococci, and a few in chains, like streptococci.

January 26th. Leucocytes, 11,600. Culture made from aural pus yesterday yields growth of streptococci.

January 28th. Leucocytes, 17,300.
January 30th. Leucocytes, 12,100.
January 31st. Leucocytes, 15,800.
February 2d. Leucocytes, 16,100.
February 4th. Leucocytes, 14,100.
February 6th. Leucocytes, 8,200.

Differential count (200 counted):

Small lymphocytes	14 per cent
Large lymphocytes	3 per cent
Polymorphonuclears	83 per cent
Total	100 per cent

This case presents some interesting features, among which may be mentioned the desirability or not of exposing the

lateral sinus in primary mastoid operations. In the primary operation of this case the mastoid was thoroughly cleaned out, and the bony wall covering the sinus seemed to be in a healthy state, so it was not deemed advisable to remove it. These cases, however, are very deceptive, and notwithstanding the healthy appearance of the sinus wall, there may be a nidus of diseased bone which escapes detection and from which an infection of the sinus may take place. The infection in this case took place from the perisinus abscess near the bulb, which was not detected at the time of the first operation.

Case 2.—Acute suppurative mastoiditis, infective thrombosis of the lateral sinus and jugular vein; resection of the jugular, metastatic abscess in the leg; staphylococcus pyogenes infection.

I saw this child, Harriett H., aged seven years, on the evening of December 22, 1914, in consultation with her family physician, who stated that she had been ill with influenza for several days, and two days ago she complained of intense pain in the right ear. A paracentesis was done by another aurist at this time. When I saw the patient at 11:30 p. m. her temperature was 101.2°, very restless, and complaining of intense pain in the ear. An examination of the ear showed the canal filled with a thick, purulent secretion, which, when wiped away, enabled me to see the drum, which was intensely swollen and red. The perforation was in the posterior quadrant, and seemed sufficiently large to admit of free drainage. There was no sagging of the posterior wall of the canal, but there was some tenderness over the mastoid. How much of this was real and how much was due to the general irritability of the child, I was unable to state. The ear was ordered douched hourly with a hot saturated solution of boracic acid. The pain was soon relieved, and she slept through the night, having to be awakened at the stated intervals for the douching.

December 23d. Today she seemed quite comfortable, not complaining of pain except when the mastoid was pressed on firmly. The temperature at 8 a. m. was 98.4°; 12 noon and 4 and 8 p. m., 98°. At 11 p. m. it suddenly rose to 101.4°. The ear appeared to be draining well.

December 24th. The general conditions were about the

same. The low morning temperature was 98°, and the highest in the evening 101.8°.

December 25th. At 4 a. m. she was very restless and the thermometer showed her temperature had risen to 103°. At 8 a. m. it was 102°; at 12 noon, 100.8°. There was a decided change for the worse in the appearance of the child, and a decided tenderness over the mastoid. She was immediately taken to the Episcopal Eye, Ear and Throat Hospital, and at 2:30 p. m. a simple mastoid operation was done. The mastoid was found already badly affected, pus in the antrum, and some soft diseased bone extending through the process down to the tip; pus in considerable quantity was evacuated between the membranous and bony wall of the auditory canal where the anterior flap was well pushed forward. The mastoid process was completely exenterated down to and including the tip. The bony wall covering the lateral sinus was carefully examined, and a portion of the wall, about an eighth of an inch, was removed at about the middle of the sinus, exposing the vein, which had a healthy appearance to the eye and also on palpation. At this time it did not appear that the sinus was involved, so the usual dressings were applied and the patient returned to her room in good condition. Evening temperature at 6:45, 100°; 12 midnight, 99.2°.

December 26th. Temperature: 9 a. m., 101.4°; 12 noon, 101°; 4 p. m., 101.2°; 8 p. m., 102°.

December 28th. The temperature continued to rise and fall during the past two days, showing a decided septic character. Otherwise the patient seemed to be doing as well as she could at this stage.

December 29th. Temperature: 1 a. m., 103.6°; 8 a. m., 99.4°; 12 noon, 98.2°; 4 p. m., 98°; 8 p. m., 98°.

December 30th. The temperature remained low today, ranging from 98° to 98.8°. The wound was dressed at 1:30 p. m. Little or no secretion found on the dressings, and the wound itself presented a very dry and glazed appearance.

January 1st. The temperature continued to pursue an irregular course; 8 a. m., 100.8°; 12 noon, 99°; 4 p. m., 100.4°. Wound dressed again, and presented a healthier appearance in that the tissue did not present such a dry condition. Dressings somewhat moist. Temperature, 8 p. m., 104°.

January 5th. Temperature: 8 a. m., 100.8°; 12 noon, 99°; 4 p. m., 99.2°; 8 p. m., 98°.

January 6th. The general condition of the patient remained about the same. Temperature, 8 a. m., 100.4°; 12 noon, 99.6°; 4 p. m., 100.2°; 8 p. m., 104°. The wound was dressed again today, and its general appearance was satisfactory; granulations forming, and healthy in character.

January 8th. Temperature: 8 a. m., 100°; 12 noon, 99.8°; 4 p. m., 100.4°; 8 p. m., 103°, and at 11 p. m. it had risen to 105°.

January 9th. The patient passed a very restless night, and the earliest recorded temperature this morning, owing to the child being asleep, was 97.6° at 11 a. m., 97° at 12 noon. She complained several times during the night of being chilly, following which the extremities and face were quite moist. Dr. William B. Mason saw the case in consultation and assisted me in the operation at 1:30 p. m. Under ether anesthesia the mastoid wound was thoroughly explored and all granulation tissue removed with the curette. The bone covering the lateral sinus was removed, exposing the sinus for some distance over the transverse sinus posteriorly and down to the bulb. At the junction of the lateral and sigmoid sinus the vein showed a dark grayish appearance, extending back toward the torcular; from the point of exposure at the time of the original operation to the bulb, the vein presented a different appearance, being quite blue and soft to the touch. The vein was then opened and found thrombosed, and it was then freely opened from an inch behind the sigmoid bend to the bulb, and a firm clot was removed with the curette. As no return flow of blood occurred, the curette was passed well back toward the torcular, and fragments of clot removed until a free flow of blood was obtained. The transverse sinus was then blocked off with an iodoform gauze tampon. The lateral sinus was then gently curetted as far as the bulb, until all the clot that could be reached was removed. As there was no flow of blood, an incision was made along the anterior border of the sternocleido mastoid muscle, extending from just below the mastoid process to within an inch of the clavicle, and the jugular vein was exposed. After separating it from its sheath, two ligatures were passed around it and tied. The thyroid and facial veins were ligated, and

about two and one-half inches of the jugular were removed. The wound in the neck was not closed, but packed with iodoform gauze, and a small gauze wick was passed into the sinus end of the bulb as far as possible, and the usual mastoid dressings applied. The child's condition at the time of and during the operation was very critical, the pulse being 148 and the respiration 30. Although she lost very little blood, she was very weak. Dr. Blair Spencer, her family physician, gave her strychnin sulphat, grain one-sixtieth, hypodermically, and administered seven hundred cubic centimeters normal salt solution through the median cephalic vein, after which she rallied and was in fair condition when returned to her room. The operation lasted a little over one hour. The jugular vein, when opened, was found to be filled to its full extent with a solid clot. A culture made from the clots taken from the lateral sinus, the jugular vein and from the blood removed from the vein in the arm all yielded staphylococcus pyogenes. A vaccine of 500,000,000 was prepared from the various strains.

January 10th. She passed a very restless night, but there was a marked improvement in the quality of her pulse, which at 8 a. m. was 108; temperature, 99°; 12 noon, temperature, 99.2°, pulse 102; 4 p. m., temperature 98.4°, pulse 108; 8 p. m., temperature 100.6°, pulse 100.

January 11th. At 3 a. m. the temperature rose to 103.4°, but gradually dropped, ranging from 98.4° to 100.2°.

January 13th. The patient has been gaining in strength during the last forty-eight hours, and the temperature during this period has remained low, ranging from 98.4° to 99.2°. The wound was dressed at noon, the packing at the knee was not disturbed, but the gauze from the mastoid and neck wounds was removed and the parts looked healthy. No pus was found in the wounds, but by gently pressing upward from the neck pus flowed freely into the mastoid from the bulb. Temperature, 6 p. m., 98.2°; complained of feeling chilly. Temperature, 7 p. m., 104°.

January 14th. Temperature: 8 a. m., 100.4°; 12 noon, 101.4°; 4 p. m., 101.4°; 8 p. m., 103.6°. Wound dressed at noon; pus still flowing from the mastoid end of the bulb on gentle pressure on the neck. Gentle irrigation with a small syringe through the mastoid end of the bulb brings away

small clots of foul-smelling pus. At 4 p. m., one-half cubic centimeter autogenous vaccine was administered in the arm.

January 18th. During the past three days the patient's condition remained about the same, the temperature assuming the general septic character. Early morning temperature today, 98°; 12 noon, 103.8°; wound dressed at 2 p. m., both neck and mastoid wounds granulating. The ligature at the distal end of the jugular having sloughed off, a small canula was inserted in the vein, and with gentle irrigation a partially broken down and foul smelling clot, mixed with pus, was washed out of the mastoid end of the bulb. A gauze wick was introduced into the mastoid end of the bulb and the dressings reapplied. Twelve minims of vaccine given in the arm at 4 p. m.; temperature, 104.2°. At 8 p. m. the temperature was 103.4°. The wounds were dressed every second day, owing to the difficulty in draining the bulb, which continued to secrete pus in considerable quantities. Notwithstanding the septic temperature the patient was running, she continued to gain in strength.

January 20th. Twenty minims of vaccine were administered in the arm. The temperature continues irregular.

February 4th. For several days past the child has complained of a pain in the left leg. An examination showed a decided red spot about the size of a fifty-cent piece on the outer side of the left leg, which was tender and fluctuated on pressure. She was taken to the operating room, and under ether the mastoid and neck wounds were dressed. Pus had practically ceased to form in and around the bulb, both wounds granulating rapidly. A free incision was then made over the swelling on the left leg, and a large quantity of thick, greenish pus, which had burrowed down between the muscles of the leg, was evacuated. The abscess sac was thoroughly curetted and the wound packed with iodoform gauze. The temperature, which had been practically normal for several days, suddenly rose at 6 p. m. to 103.4°. This dropped gradually during the night, and at 8 a. m. on the morning of February 5th was 98.2°. From this time on the temperature gradually became normal. The wounds in the mastoid region, the neck and the leg granulated rapidly, and the child's convalescence was uninterrupted and she was discharged

from the hospital on February 12th. The subsequent dressings were done at the house and at my office.

The temperature charts are very characteristic in these cases. In Case 1 the ordinary stock streptococcus serum was used. In Case 2 a vaccine of 500,000,000 was prepared from various strains made from a culture obtained from the blood taken from the patient's arm and from the clots of the lateral sinus and jugular vein.

January 14th. One-twentieth cubic centimeter, or about 25,000,000, were injected into the patient's arm.

January 16th. Twelve minims were injected into the right thigh.

January 20th. Twenty minims were injected into the left thigh.

As there was no appreciable influence on the temperature, no further injections of the vaccine were given.

The leucocyte counts were as follows:

December 25th, 13,000.
January 3rd, 16,400.
January 5th, 13,100.
January 8th, 12,000.
January 17th, 11,000.
January 18th, 12,000.

Relative number of leucocytes.	Per Cent.	Number Counted.
Small lymphocytes	26.0	65
Large lymphocytes / Large mononuclears	7.6	19
Polymorphonuclears	66.4	166
	100.00	250

All of the bacteriologic work and blood counts in these cases were done by Dr. J. B. Nichols, the pathologist of the hospital.

While the infection in Case 1 was of a more virulent type, it did not present the same difficulties as were met with in Case 2.

An interesting point in Case 2 is that in the original operation the sinus wall was exposed from just below the knee to near the bulb, and about an eighth of an inch removed, exposing the sinus, which at this time did not appear to be

affected. On January 9th, when the sinus was thoroughly exposed, it was found solidly thrombosed from near the torcular to and involving the jugular vein to its full extent. The point of infection apparently was at the knee, although there was no diseased bone in this vicinity. The infection must have taken place through some of the smaller veins rather than from any direct contact of septic matter with the sinus itself. The greatest difficulty we met with in the management of this case was in relieving the bulb of the septic clot, and its resulting perisinus inflammation. It was the prolonged suppuration in this region which caused the continued general septic condition.

It is the bulb complication that causes so much trouble in the management of these thrombosis cases. While I removed the bone covering the sinus as far down as the point where it bends, it was not sufficient to bring about complete drainage, and it was only by the most persistent and constant cleansing of these parts that I was able finally to overcome the suppurating condition.

Fortunately, both of these cases were brought to a successful termination, notwithstanding that a marked general septic condition was present before the source of infection was shut off from the general circulation.

How much the vaccine therapy had to do with the subsidence of the septicemia is a question. In the first case I believe the antistreptococcus serum had a beneficial effect, but in the second case I doubt whether the autogenous vaccine had any effect at all upon the general systemic poisoning.

XXXVI.

CASES OF LATERAL SINUS THROMBOSIS.*

By George W. Boot, M. D.,

Chicago.

Case 1.—Turbinectomy, acute suppurative otitis media, mastoiditis, sinus thrombosis, pyemic abscess. Recovery. D. T., American; single; aged eighteen years; laborer. Admitted to Cook County Hospital May 25, 1914, on the service of Dr. Friedberg.

History.—One month ago patient was operated on at a dispensary for enlarged turbinates. He used a nose wash which he snuffed up his nose. A few days later he complained of pain in the right ear. This was soon followed by a discharge from the ear. The ear has been running ever since, and the pain continued until the evening before he was admitted to the hospital. At this time patient became feverish and felt sick. He has had no chill, nausea or vomiting.

Previous History.—He has always been well.

Family History.—Father alive and well. Mother dead of unknown cause. Two brothers and one sister alive and well.

Habits.—Does not drink or smoke. Venereal history negative.

Examination.—Patient appears to be quite sick.

Eyes.—Pupils equal and react to light.

Ears.—There is a purulent discharge from the right ear. There is extreme tenderness in the region below the right auricle and over the tip and lower portion of the right mastoid. There is no redness or swelling over the mastoid.

Mouth and throat negative. Temperature 104.2°; pulse 128; respiration 24. Blood examination, 20,100 whites.

Operation.—A mastoid operation was done the same afternoon by Dr. Friedberg. I find the following notes concerning the operation:

The bone harder than usual and congested. Cells free from

*Read before the Chicago Laryngological and Otological Society, March 16, 1915.

pus, except one small one found near the antrum. Lateral sinus exposed and to all appearances normal. A small drain inserted and wound closed.

POSTOPERATIVE HISTORY.

May 27th. 7:15 a. m., patient had a severe chill lasting ten minutes. 8:10 a. m., temperature 104.4°; pulse 128; respirations 28. Slight discharge from the wound. Profuse discharge from the canal. Tongue heavily coated. No rigidity of neck. Blood examination, 11,500 whites.

May 28th. Temperature has been irregularly high since yesterday. Blood examination, 12,900 whites. Blood culture negative.

May 29th. Temperature still irregular. Blood examination, 14,000 whites. The temperature continued irregular until June 3d, when, in Dr. Friedberg's absence, I reopened the mastoid, exposed and opened the lateral sinus. A thrombus was removed after evacuating pus. Free bleeding was obtained from the upper portion of the sinus but not from the lower. The upper end was tamponed with iodoform gauze, a drain inserted and the wound dressed. Following this operation the patient stated that he felt well. His temperature did not remain normal, though it fell to normal at times.

June 6th. Complains of pain in the right shoulder. Temperature 102.8°.

June 7th. 11:45 a. m., severe chill. Temperature 97°; pulse 116; respirations 26. 12:30 p. m., temperature 104.2°.

June 9th. 3:00 a. m., slight chill. Temperature 100°. 5:00 a. m., intense pain in shoulder, arms and hips.

June 11th. Blood examination, 20,080 whites.

Operation.—The right jugular vein was exposed and opened, liberating about three drams of pus. The opening in the vein was just at the level of the occluding thrombus, which was not disturbed. The vein was not ligated. A small rubber drain was passed upwards inside the vein as far as the temporal bone.

June 12th. Tenderness and swelling over the left great trochanter.

June 24th. Abscess over the left great trochanter opened and about a pint of pus evacuated.

June 28th. Wound in neck closed. Mastoid wound clos-

ing. Wound in thigh healing rapidly. No pus. General condition good. Discharged.

This case shows what a serious condition may develop following turbinectomy and probably improper cleansing of the nose. It also shows what a severe amount of trouble may occur in a case where there is apparently but slight infection in the mastoid, as shown by the single mastoid cell found containing pus at the first operation. I regret in this case that I did not ligate the jugular vein at the time of the sinus operation. I feel that had this been done the patient would have been saved a good deal of risk; that he would not have had the large abscess over the trochanter, and that he would have recovered promptly instead of becoming very much emaciated before his final recovery.

CASE 2.—SCARLET FEVER, ACUTE SUPPURATIVE OTITIS MEDIA, MASTOIDITIS, SINUS THROMBOSIS. HEMORRHAGE. DEATH. I. K., male, aged four years; Jewish-American. Admitted to Cook County Hospital May 8, 1914, with scarlet fever. Was given one thousand units of antitoxin.

May 10th. Body very itchy. Uticaria lotion applied.

May 11th. Ten thousand units of antitoxin given. Culture negative for diphtheria. 10:30 a. m., five thousand units of antitoxin given.

May 12th. 8:00 a. m., ten thousand units of antitoxin given. 10:00 p. m., five thousand units of antitoxin given.

May 13th. Ten thousand units of antitoxin given.

May 14th. Ears began to discharge today.

May 19th. Ten thousand units of antitoxin given. The large amount of antitoxin given, fifty-five thousand units, in spite of the negative cultures, was for the reason that the whole interior of the nose was filled with false membrane and the case appeared as a severe case of nasal diphtheria.

May 30th. Simple mastoid operation done on the left side. As soon as the periosteum was incised, pus was revealed. The mastoid cells were cleaned out and a gauze drain inserted. Duration of anesthesia, twenty-five minutes.

June 9th. 11:30 a. m., temperature 94.6°, pulse 84, respiration 18.

June 10th. 1:30 a. m., temperature 95.6°; shivers frequently. 5 p. m., temperature 105.6°, pulse 160, respiration 48. Wound reopened because of a variation in temperature

of eleven degrees in a few hours. Sinus exposed, opened and thrombus removed. Free bleeding was secured from each end of the sinus. Tampon of iodoform gauze. Ether anesthesia of thirty minutes. Examination of the urine today showed hyalin, granular and epithelial casts and a trace of albumin.

June 11th. Temperature 104.8°, pulse 160, respiration 36.

June 12th. Patient managed to tear off all the dressings and following this had a profuse hemorrhage from the sinus. Fortunately the interne caught him before he was completely exsanguinated and repacked the sinus.

June 13th. On changing the dressings today there was profuse bleeding.

June 14th. Patient again removed the dressings and had considerable bleeding. Wound again repacked by the interne.

June 16th. Patient died about 2:00 p. m.

This patient died of toxemia from the scarlet fever, although this was doubtless assisted by the loss of blood which occurred at the time when he tore off his dressings, and in all probability the large amount of antitoxin which he had taken contributed to the fatal result.

CASE 3.—PNEUMONIA, ACUTE SUPPURATIVE OTITIS MEDIA, MASTOIDITIS, SINUS THROMBOSIS. RECOVERY. I. W., female, aged three years, six months. German-American. Family history negative.

Previous History.—Child was well until five weeks ago, when she had an attack of pneumonia from which she made a good recovery.

Present Illness.—Two weeks ago she was taken with a severe pain in the right ear. The drum membrane ruptured spontaneously and the pain became easier. The discharge stopped after one day. Five days later a swelling appeared behind the ear. Patient was admitted to the Children's Memorial Hospital May 27, 1914, with a temperature of 105°. The right canal was wet with pus and there was some redness and tenderness over the right mastoid, otherwise the examination was negative.

May 28th. Throat culture negative for diphtheria.

May 29th. Temperature 102°.

May 30th. 8 a. m., temperature 100.8°. 12:10 p. m., mastoid operation. After the usual preparation the mastoid cells were cleaned out and the lateral sinus exposed. It was found

to be eroded and thrombosed. Mucopus was found around the sinus. Free bleeding was secured from the upper portion of the sinus but not from the lower. The upper portion was closed by a tampon of gauze and a drain inserted.

June 2d. Temperature 106°. Very fretful. Often cries out. No rigidity of neck. No spasticity or rigidity of extremities. No Babinski or Kernig.

June 6th. Temperature was continued irregular.

June 8th. Jugular vein exposed and found filled with an organized thrombus. From this time on her temperature gradually improved until June 24th, when she was found to have diphtheria and was transferred to the isolation ward, from which she was discharged July 18th, completely recovered.

The condition in the sinus in this case was very similar to the condition found in Case 1, but fortunately for her the thrombus in the jugular bulb and vein became organized instead of breaking down into pus, and there were no pyemic abscesses.

CASE 4.—CHRONIC SUPPURATIVE OTITIS MEDIA, MASTOIDITIS, FACIAL PARALYSIS, ERYSIPELAS. Russian, laborer, aged twenty-one years. Admitted to Cook County Hospital December 7, 1914. The history as obtained through an interpreter is as follows: Four weeks ago trouble began as diffuse pain over the left parietal region. Pain was dull and heavy. Three weeks ago had pain over face, especially lower part. There is loss of hearing in left ear for spoken voice and watch. Patient says that he had no pus coming from ear. Muscles of neck somewhat rigid and sore. Throat not sore. No other history obtainable. Speaks poor English. Voice slightly hoarse.

Past History.—Thinks he had previous sore throat. No other illness. Family history negative. Denies lues.

Physical Condition.—Tenderness quite marked over mastoid and occipitotemporal region. No signs of local inflammation. No palpable masses or fluctuation.

Ears: External right ear not swollen. Tender and painful on movement. No pus from external meatus. Drum looks thickened and congested. Left ear not affected.

Neck: Muscles rigid, especially posterior cervical. Glandular enlargement marked.

Eyes: Negative.

Face: Complete seventh nerve paralysis on right side, including eyelids and forehead.

Mouth: Negative.

Throat: Slight chronic pharyngitis.

Chest: Negative.

Heart: No thrills or murmurs.

Lungs: Negative.

Abdomen: Negative.

Extremities: Negative.

Diagnosis: Chronic suppurative otitis media with mastoiditis and facial paralysis.

December 12, 1914. Operation, lasting one hour and thirty minutes. The usual incision was made behind the right auricle. The outer wall of the mastoid was found to be of ivory hardness and about four or five millimeters thick. When this was removed a large cavity was found, about 1x1x1.5. The knee of the sigmoid sinus projected into this cavity. When the cavity was cleaned out it was found that in its floor were two sequestra which must have reached almost to the labyrinth.

The usual plastic was done on the membranous canal and the wound closed.

December 16th. Patient is able to close right eye.

December 16th. 8 p. m., the dressings were changed throughout. Temperature 102.4° this morning. 8 p. m., right side of face swollen. Temperature 104.2°. 9 p. m., right side of face swollen, red, elevated, with sharply defined margins. Redness extends over nose and is beginning to surround left eye. Erysipelas.

December 18th. Left side of face clearing up; right side shows spreading of erythema.

December 21st. Erysipelas of face clearing up. Right sided facial paralysis clearing up. Blood cultures negative. Twenty-eight thousand leucocytes.

December 22d. Temperature normal from 4 a. m. to about noon, when it was found to be 103.6°. Patient had been chilly for a day or two at intervals. With the facial erysipelas clearing up rapidly, the chill and temperature caused me to suspect a sinus thrombosis. Accordingly, he was anesthetized and the bone removed still farther from over the sinus, with the intention of exploring the same. In removing a piece of

bone with the biting forceps a small splinter penetrated the sinus and free bleeding occurred, putting an end to my suspicions of thrombosis. The sinus walls were softened and covered with granulations. The sinus was tamponed and the wound packed.

December 26th. Red, elevated, clearly demarcated area upon back of neck, shoulders and upper half of back. Erysipelas recurrens.

December 28th. Redness extends to level of eleventh dorsal vertebra with sharp margin, clearing in upper part. All dressings in ear changed.

December 29th. Erysipelatous area extends further down back, also upon front of chest and left arm. Fading in old areas.

December 31. Erysipelatous area has extended to lumbar region, below nipple line and below elbow.

January 8th. Erysipelatous eruption has wholly disappeared. Temperature normal.

I reported this case to show the difficulties which may occur at times in the diagnosis of a sinus thrombosis. This patient had a streptococcus infection, causing erysipelas, but the streptococcus, we know, frequently causes sinus thrombosis. There seemed to be fully as much chance that a sinus thrombosis was occurring as that an erysipelas was recurring, and knowing the virulence of streptococcus infection about the ear, I proceeded to explore the sinus without waiting; had I waited another twenty-four hours, I probably would not have operated on the sinus.

In cases 1 and 3 I was not able to get free bleeding from the lower extremity of the sinus—that is, from the jugular bulb. Under similar circumstances in the future I expect to ligate the jugular vein. It seems to me the small amount of danger to the patient is fully offset by the lessened risk of pyemia, and I am sure that I shall have much less anxiety about these cases if I know that the vein is ligated and severed. Case 3, of course, shows that under these circumstances the thrombus can be organized, but all the while this thrombosis was organizing the patient was running a septic temperature, and I was not certain until the jugular vein was exposed and found it was not filled with pus as was Case 1.

XXXVII.

REPORT OF A CASE OF BRAIN ABSCESS WITH UNUSUAL FINDINGS.*

By George L. Richards, M. D.,

Fall River, Mass.

The following case of brain abscess seems of sufficient interest to report, even though it was an unsuccessful one. I have the feeling that the statistics of brain abscess as published are better than the facts really warrant, since many of us hesitate to report and put on record our unsuccessful cases.

The patient, a Swede, carpenter by occupation, and twenty-four years of age, was admitted to the Union Hospital in Fall River on the evening of April 14, 1915. The family history was negative, but he said he had been sick several years ago with hemorrhages of the lung but had recovered. The only thing in the immediate previous history of moment was the fact that he had two or three fingers bound up as the result of a scratch or injury in his work, and on examination similar scres were found on other parts of the body. He stated that a small wound of the hand or elsewhere healed rather slowly.

Present History.—Three weeks ago he had some trouble with his right ear. He consulted a physician, who incised the drum. This gave relief for a short time, but the pain returned, accompanied with sudden and severe headaches. A physician was called, who treated him for a few days for these same symptoms. In addition there was some nausea but no vomiting. There being no improvement and his mental condition becoming somewhat sluggish, he was sent to the hospital, where, owing to my absence from the city, he was first seen by another member of the staff, who incised the drum with some relief. At this time there was only slight pain in the ear, and no mastoid tenderness. I saw him for the first

*Read before the American Otological Society at its Forty-eighth Annual Meeting, at Niagara Falls, June 4, 1915.

time the morning after he came to the hospital, April 15th, when the drum incision had almost entirely closed except one small point, and I reincised it. He complained of no pain on pressure, and there was very little discharge after the drum incision. Pulse fifty-six to sixty, temperature ninety-nine degrees, respiration about twenty-four. Mental condition a bit sluggish, but answered questions fairly well, although never giving a good account of his previous illness. It was impossible to find out from him just when the drum was first incised or any clear account of the initial symptoms. His principal complaint was of severe headache, rather frontal in character, relieved somewhat by the ice bag, and this headache never entirely ceased. He was in bed with the ice bag over his head, eyes closed, apparently stupid, but would rouse to answer any questions. There was no muscular rigidity or paralysis, the reflexes were all present but slightly sluggish, and there was no nystagmus. An ophthalmoscopic examination of the right eye showed a choked disc of about three diopters.

April 16th there was only a slight discharge from the ear, but several hours would elapse before the small wick placed in the external canal was wet through. An X-ray picture was taken and a diagnosis returned of infiltration in the region of the right mastoid, probably extending well up into the middle fossa. The pulse dropped lower and ranged all the way from forty-five to fifty-eight. He asked for the ice bag constantly, and lay in a rather stuporous condition, but said he was all right and would be as well as ever in a few days if let alone. Later, on the evening of this day, the symptoms seemed to grow worse, the temperature went up to about one hundred, and the diagnosis of brain abscess in temporosphenoidal lobe seemed to be plainly warranted, even in the absence of any paralysis, so he was made ready for operation. On entering the operating room, however, he refused to be operated upon, and every effort to gain his consent failed. He maintained that he was twenty-one years of age, his own boss, and that we had no right to do anything to him. If we would only let him alone he would be all right. He would fool us all yet, and be all right in the morning. He was therefore returned to the ward.

April 17th, the third day after admission, the pulse was forty, temperature normal, and the respiration twenty-four.

The choked disc had increased to almost five diopters, the cerebration was more sluggish, reflexes less active, and the ears discharging very little. He was still complaining of severe frontal headaches, but there was no pain over the mastoid. A telegram was sent to the patient's father. He arrived the following morning, and after much difficulty obtained consent for operation, which was done at three o'clock in the afternoon of the same day. He took ether rather slowly, requiring three-quarters of an hour, but was easily kept under once it was attained.

The usual operation for an acute mastoid was first performed. There were a few soft cells and a drop or two of pus in the region of the antrum, but no general breaking down of the mastoid cells. The antrum was rather higher and deeper than usual, a millimeter or two above the spine. No apparent cause for his symptoms having yet been found, the incision was extended upwards and forwards and the bone removed until the dura was bared. There was no apparent pulsation, so with the aid of rongeur forceps the bone was cut away an inch to an inch and a quarter above the antrum. As the rongeur was being used in this region, a slight flow of pus appeared on the surface. As more bone was cut away, the flow of pus increased. Considerable amount of bone was now carefully removed, when it was found that we were directly over a large abscess cavity beginning a very short distance beneath the dura and extending towards the center of the brain and anteriorly. A crucial incision was made in the dura and the brain structures incised. The abscess was so near the surface that it was not necessary to make a very deep cut. From two to three ounces of pus were evacuated. Careful examination with the probe showed a cavity without any definite walls. The bulk of the pus being evacuated, rubber drainage tubes of the collapsible type, three in number, were pinned together and inserted about an inch to an inch and a half into the abscess cavity and anchored to the skin edge. The idea in using these tubes was that the drainage would occur in the spaces between them as well as through the tube, and that they would not block up, while if the cerebral pressure increased very much they would easily be forced out, nor would they traumatize in any way. It is well known that the problem of drainage in abscess cases is a difficult one, owing to

the soft and easily collapsible walls of the abscess cavity. The wound was not sutured at any point. The operation lasted about an hour, and at nine o'clock in the evening he seemed decidedly better, was apparently conscious, the pulse had gone up to sixty-seven and his general condition seemed improved.

April 19th he had a restless night and complained greatly of pain the following morning, so the wound was dressed. The rubber tubes had been pushed out, and so were replaced by dry gauze wicks. A small amount of pus was steadily exuding. During the day the patient grew gradually worse, and by evening was almost entirely unconscious. The pulse had again gone down to forty-eight, the reflexes were quite abolished, and his only conscious remark was "Such a terrible headache." The interne reported that during the night there was a convulsion. At two o'clock the following morning, April 20th, he died.

Laboratory Findings.—He came to Fall River from Paterson, New Jersey, and gave a history of having had chills and vomiting spells. The chills he said he had had off and on for several years. Examination of the blood showed a white count of only 6,000; hemoglobin, 80 per cent; polynuclears, 63 per cent; large mononuclears, 18 per cent; small mononuclears, 16 per cent; eosinophiles, 2 per cent; mast cells, 1 per cent. With this unusual picture in a case apparently due to a mastoid or some abscess connected with the mastoid, a search was made for typhoid, tuberculosis and malarial organisms. Tuberculosis organisms were not found, the Widal reaction was negative, the malarial plasmodium were found on two examinations of the blood, and there was an enlarged spleen about two finger breadths below the ribs. In the first specimen of unstained blood these organisms were very motile, and seen very plainly. There was nothing definite or unusual discovered in the urine except almost a pure culture of colon bacilli. A spinal puncture was made just before the operation, the patient refusing this before, also refusing blood for a Wassermann. An examination of this spinal fluid showed three hundred and forty-three cells to the square millimeter, and a culture growth of staphylococcus, a negative Wassermann, Abderhalden was not done. Spinal fluid taken at the time of the autopsy, twelve hours after death, showed a strongly positive Wassermann and a culture growth of pneumococ-

cus. The culture made from the pus from the abscess showed pneumococcus. Pneumococcus was also grown from the spinal fluid taken at the autopsy.

Partial autopsy made by Dr. D. J. Fennelly, hospital neurologist, twelve hours after death. Brain exposed by removing large area of bone, vessels of pia injected throughout, more marked in right hemisphere. Tried to remove brain en mass, but this was impossible on account of bogginess of substance. Removed part of cerebrum and part of cerebellum. Following incision of operation the abscess cavity was found directly beneath the opening that had been made at the operation for drainage. The cavity was found to be about two inches wide by one and one-half in depth. This had ruptured into the right ventricle, and the ventricle contained a semiliquid pus. The bones about the tip of the mastoid and the labyrinth macroscopically had an almost normal appearance. Microscopic examination was made of the brain tissue, sections being stained after the method of Nissl. Chromatolysis had taken place, the cell bodies being considerably swollen and the nucleus in many places peripherally located. Sections were also stained for intracellular fat, which was found to be present. Not much fat was found in the nerve fibers.

Some points of interest are: First, almost entire absence of tenderness over the mastoid at any time during his illness; second, extremely late abolishment of any of the reflexes in so extensive a process as the partial autopsy and operation proved; third, low leucocyte count; fourth, presence of malarial organisms; fifth, colon bacillus in the urine; sixth, pure culture of pneumococcus in the pus and the spinal fluid after death; seventh, negative Wassermann before death and a triple positive a few hours after death and absence of a cavity wall.

Did the malarial organism alone account for the leucopenia or difference in the Wassermann reactions? How account for negative Wassermann a few hours before death and a strongly positive a few hours after death? (This fluid was divided into several tubes, and all the tests were made at the same time with the same results, each test tube containing postmortem fluid was positive and each antemortem negative.) What had the colon bacillus to do with the case?

XXXVIII.

A CASE OF OTITIS MEDIA AND MASTOIDITIS FOLLOWED BY MENINGITIS — OPERATION — RECOVERY. AFTER EIGHT YEARS, DEVELOPMENT OF CEREBRAL ABSCESS—OPERATION—DEATH.*

By S. J. Kopetzky, M. D.,

New York City.

H. A., aged fifteen months, came under observation January 16, 1908, suffering with a very profound mastoid infection. Incision of the membrana tympani immediately undertaken, but because of no remission of symptoms and profound prostration, he was taken to the New York Red Cross Hospital and operated upon by me on January 18, 1908, two days after the advent of the disease. The disease was on the right side.

Nothing unusual was found at operation and the patient came out of anesthesia in good condition. During the 19th and the day of the 20th there gradually developed coma and the classical symptoms of meningitis. A consultation with Dr. L. K. Neff the evening of the 20th substantiated the diagnosis.

(The history chart of that time—1908—leaves much to be desired for a full and complete record of the case.)

Clinically, fever, failure to react to stimuli, opisthotonos and vomiting are recorded.

Believing we were dealing with a case of serous meningitis in which pressure symptoms predominated in the clinical picture, the patient was submitted on the evening of January 20th to a regional decompression operation as I was at that time performing it.

The operation consisted in exposing the squama of the temporal bone and opening to the dura through it, the bone not

*Read before the New York Academy of Medicine, Section on Otology, April 9, 1915.

being removed as an osteoplastic flap, but eaten away with a rongeur until the requisite amount of dura exposure was obtained. The zygomatic root and its extension backwards was left as a ridge of bone to hold the brain and dura in place. The tegmen cellulæ was next removed, exposing the dura there. The dura was found tense and pulseless, and parallel incisions were made through it both in the region of the tegmen and in the region beneath the removed squamosa.

A large amount of clear cerebrospinal fluid began to come from these openings, and the brain tissue bulged through the dural incisions. Drains of gauze were gently introduced and the skin edges approximated over the exposed area.

The next few days witnessed a marked improvement in the patient's condition. The most noteworthy was the complete relief of all symptoms and the excessive flow of cerebrospinal fluid. The dressings were saturated as well as the pillow upon which the patient lay. This continued for three days and finally ceased, and at subsequent dressings the drains were all withdrawn.

The patient eventually developed a hernia cerebri at the site of the open squamosa, the brain tissue, covered with granulations, protruding between the skin edges. By using graduated pressure applied by means of broad pads over the hernia the brain tissue was finally brought back into the skull cavity, but that portion of the hernia which protruded downward through the tegmental opening into the mastoid cavity was never replaced, because it was impossible to do so, and the granulation gradually grew in onto the rest of the mastoid cavity and merged with those from the brain substance and completely filled the cavity.

Finally, skin grew over all, and until this year the child presented no severe symptoms except such as I shall indicate.

The patient left the hospital on January 31, 1908, and the further history of the case was uneventful with these exceptions: When the child's position was shifted from the horizontal to the vertical, or was turned over rather suddenly while in arms, there seemed to be a period, at first of a minute or two and later of only a few seconds, when he would lose consciousness. If crying, he would become absolutely quiet, and then, the period having passed, he would resume where he had left off. If crowing with pleasure or otherwise exhib-

iting his consciousness of pleasurable sensation, the same thing would happen. I thought this had been due to the fact that the brain had become anchored by adhesions at the site of operation and hernia, and that the sudden shifting of the patient's position gave the brain a traumatic shock which produced the periods of suddenly arrested consciousness. Gradually his brain accommodated itself to the abnormality resulting from this lesion, and after six months such periods of loss of consciousness were no more to be noted.

The child presented a normal, somewhat large appearance for his age, but he did not attempt to walk until well past his second year, and his attempts at speech were equally slow. However, later, at the usual age, he attended school and kept well abreast of his class, although always a little slow in speech.

I saw the child again on February 8, 1915. He had an acute purulent rhinitis and complained of pain in the head, showing a temperature of 105° F.

The otoscopic examination was unsatisfactory, in view of an almost complete atresia of the canal walls.

Under general anesthetics the edematous tissue in the canal and the drum membrane were incised. The discharge gave the streptococcus pyogenous.

The patient's general condition remained good, mind clear, no absence of reflexes, no exaggeration of same, pulse rate between 110 and 130, respirations about 30.

For three days the condition continued, the temperature meanwhile ranging between 104° to 101°. The discharge from the canal was scanty and was deemed inadequate.

The patient was admitted to the Manhattan Eye, Ear and Throat Hospital on February 11, 1915, after a thorough physical examination had been proven negative.

Blood culture and spinal fluid examination were undertaken just before operation. The blood culture was negative. The spinal fluid was examined by Dr. Dwyer and gave the following:

Physical.—Large flocculi scattered throughout the specimen, otherwise clear.

Chemical.—Copper reduction present and marked. Lactic acid, small amount present.

Cytologic.—Considerable number of pus cells; predomi-

nating types are polynuclear neutrophiles, large and small lymphocytes. The cells do not show much evidence of degeneration.

Bacterial.—Negative from smear. Negative from culture (later report).

Operative Findings.—Upon incising the skin and carefully dissecting it off from the soft tissues beneath it, the old wound area of brain tissue covered by dura and connective tissues is uncovered. The bony postauricular wall is found partly eaten away, and what remains is soft, diseased and easily removed. The horizontal semicircular canal is in view. When a retractor is introduced to lift the protruding brain tissue which fills the old wound cavity, a thick creamy pus without odor escapes. This came mostly from the area just above the tympanic cavity.

The cultures from the pus give pure culture of the streptococcus mucosus capsulatus.

Drainage was established from the wound, but the brain was not punctured and the patient was returned to bed. The patient ran a temperature of about 101° to 102° with remissions to 99° almost daily.

The pulse never went below 108, the respirations stood between 26 and 28. The patient never lost consciousness and sat up at the end of a week to play and attend normally to all his functions. There was nothing to explain the temperature, all the reflexes were present, nor were there any focal signs. Three cultures were taken from the blood and all reported negative.

The second week started with a similar temperature curve, and it was presumed as this curve gradually neared the normal that the patient was making an uneventful recovery, and arrangements were made for his removal home.

On the 2nd of February, however, his pulse dropped from 66 to 56 to 54. There were no signs of meningitis. The knee jerk was missed from the opposite knee, and the cremasteric reflex on the opposite side was also missed. The patient (now nine years old) complained bitterly of intense headaches and could not sleep. He located the headache in the frontal region between the eyes. An examination of the nose and pharynx showed absence of pus in the frontal sinus region.

Believing that we were dealing with another abscess somewhere, on the 23rd of February the patient was submitted to an exploratory operation of the temporosphenoidal lobe.

Operative Findings.—When the wound was reopened the temporosphenoidal lobe was entered above the ridge which had been left at the original operation, and the searcher was introduced directly inward toward the tip of the petrosa, going inward about two inches, when pus was found. Enlarging the opening, between six and eight ounces of pus was recovered. After the cavity was emptied it failed to collapse and it was, therefore, presumed to be an old chronic abscess. The thickness of the pus also gave that impression. Double reflow drains were introduced, wound edges approximated and the patient put to bed.

The patient came out of the anesthesia in the possession of all his faculties, showed a good appetite, and again it was thought he would recover. At midnight the same night the temperature was 99.8°, at three o'clock it was 102° and at six o'clock it was 103.4°. He had a general convulsion at six o'clock and another at seven, and he died during the second convulsion.

No autopsy was permitted, but a search through the brain wound was allowed, and such search was made through the entire hemisphere of the brain, but no further abscess was located.

Comment.—It is presumed that the second infection occurred on February 6th, invading the middle ear, and there being no mastoid process to become infected, the brain tissue immediately became involved and an abscess formed or a reinfection of an old abscess took place. Because of the absence of cortex over this region there practically was present the same condition that one gets when a decompression operation is performed, and so the abscess could grow and produce no focal symptoms. The pus from the abscess gave streptococcus sapsulatus.

XXXIX.

SKIAGRAPHS OF THE MASTOID IN CERTAIN ATYPICAL CASES.*

By Harold Hays, M. D.,

New York.

The X-ray pictures that I am going to present are of four different cases of mastoiditis in which the X-ray proved of a great deal of value. In the majority of cases I do not believe that it is necessary to have an X-ray picture taken in order to make a diagnosis, but there are certain borderline cases where one is in doubt as to whether the mastoid is sufficiently involved to warrant operation. In the first three pictures I am presenting, the radiographic findings were such that, taken in connection with the clinical symptoms, a positive decision could be made as to immediate operation.

Case 1.—This patient, a male, fifty years of age, had had an acute otitis media with tenderness over the mastoid antrum for some days. The tenderness finally disappeared. There was no pain, no temperature, but a slight amount of parietal headache. At the end of seven weeks an X-ray picture was taken in order to corroborate the clinical findings of mastoiditis evidenced by profuse, prolonged discharge, with a sagging posterosuperior wall.

The X-ray pictures of the right and left mastoid are here presented. One can see very definitely the difference between the two sides. On the left side (normal) the mastoid cells show up clearly and distinctly, while on the right side the entire region is clouded and the interstices between the cells are poorly defined. This cloudiness extends well beyond the sinus, which can be readily seen as a line running downward and forward between the light and deep shadows.

Operation was performed the following day. A very large mastoid was found, which was entirely destroyed. In order

*Read before the New York Academy of Medicine, Section on Otology, April 9, 1915.

to remove all the cells, a T-incision was necessary. A complete exenteration was done. The wound was closed down to the lower half inch, into which was inserted a narrow strip of iodoform gauze, placed well into the antrum. The patient left the hospital on the seventh day, and on the fourteenth day the wound was completely healed.

Case 2.—Male, age twenty, developed an acute otitis media in the right ear, due to a pneumococcus. This subsided very nicely under local treatment after four days, but at the end of that time a reinfection took place, the responsible organism being the streptococcus mucosus. There was considerable pain radiating from the mastoid up over the parietal bone. There was a slight amount of discharge from the ear, with moderate sagging of the posterosuperior wall. Numerous incisions had been made with no definite effect. An X-ray picture was taken on the second day after this latter infection. This showed the mastoid to be distinctly cloudy on the right side. Two days later a mastoidectomy was done. It was necessary to operate for a sinus infection. The patient subsequently recovered.

The X-ray in this case showed very definitely that there was considerable involvement of the mastoid cells, although the interstices between the cells had not broken down. Comparison of the two photographs (Figure II) shows very distinctly that there is cloudiness on the right side. The outline of the sinus is very clear. The X-ray picture in this case not only definitely decided the diagnosis, but was of great help in showing the size of the mastoid and the location of the sinus.

Case 3.—A boy, age six years, developed an acute otitis media on both sides, due to a staphylococcus infection. Both ears discharged intermittently over a period of six weeks, during which time the child had no temperature, no pain, and no tenderness over the mastoids. The character of the discharge changed, the culture then showing an attenuated streptococcus. I advised having the child's tonsils and adenoids removed. At the time of this operation there was a slight sagging of the posterosuperior wall on the left side. After the removal of the tonsils and adenoids the temperature rose to 104°, but during the next four days gradually dropped to normal. However, the child seemed listless and would not eat. An X-ray picture was taken which showed a diffuse cloudi-

ness over the mastoids, and after consultation with Dr. Whiting and Dr. Lewis it was decided that it would be better to open both mastoids if the child did not seem to improve within the following day or so.

Two days later a mastoidectomy was performed on the left side—the side where there had been some sagging of the drum. The X-ray of this side showed far more cloudiness than the other side. The cortex was very thick for a child of that age, and it was not until I reached the antral region that mucopus was found. This extended down towards the tip and over the sinus plate, reaching up into the superior petrosal recess. After cleaning out the cavity the wound was closed by primary suture.

As there was so much destruction on the left side, I decided it wise to open the right side, where I found a similar condition. The patient recovered within the course of the next two weeks.

In this instance we had a subacute mastoiditis in which there was no evidence of any mastoid involvement, such as pain, tenderness, or temperature, yet the X-ray showed definitely that both mastoids were diseased.

Case 4.—Male, age twenty years, developed an acute otitis media on the right side with high temperature, severe pain, and extreme tenderness. A paracentesis was performed on two occasions with very little subsidence of the symptoms. On the fourth day I determined that if the symptoms were no better within twenty-four hours it would be necessary to open the mastoid. An X-ray picture was taken, which showed a very slight cloudiness on this side in comparison with the other, but not sufficient to indicate operative interference. It was decided as a result of this to defer the operation, and on the following day the symptoms were less severe and the temperature lower. Within the following week all symptoms disappeared and the patient was discharged cured.

I feel very sure that in this last case if the X-ray had not shown so slight an involvement in comparison with the symptoms, that an operation would have been performed. In this instance the value of the X-ray examination can hardly be doubted.

In determining the value of X-ray pictures one must only consider them in conjunction with the clinical symptoms. Dr.

Dixon, who took these pictures for me, is an expert in this line, and his X-ray work of the mastoid cannot be commended too highly. Each one of the four cases illustrated, showing both mastoids, is an excellent example of what can be done in this line. His experience, extending over the past few years, leaves no doubt as to the great value of X-ray examination of the mastoid in those cases in which the clinical findings are obscure, or in those cases where one wishes to indorse his conviction that operative interference is necessary.

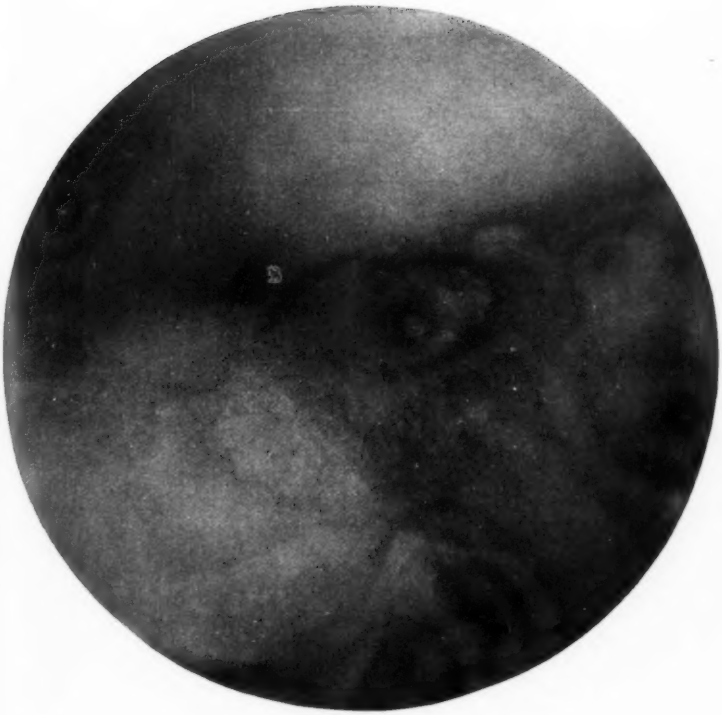

FIGURE 1.

Case 1.—Right mastoid.

FIGURE 2.

Case 1.—Left mastoid.

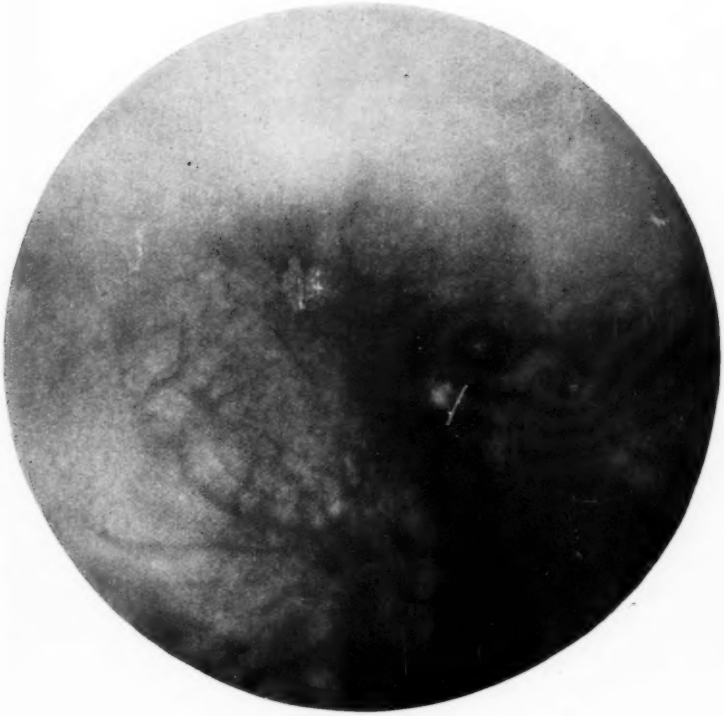

FIGURE 3.

Case 2.—Right mastoid.

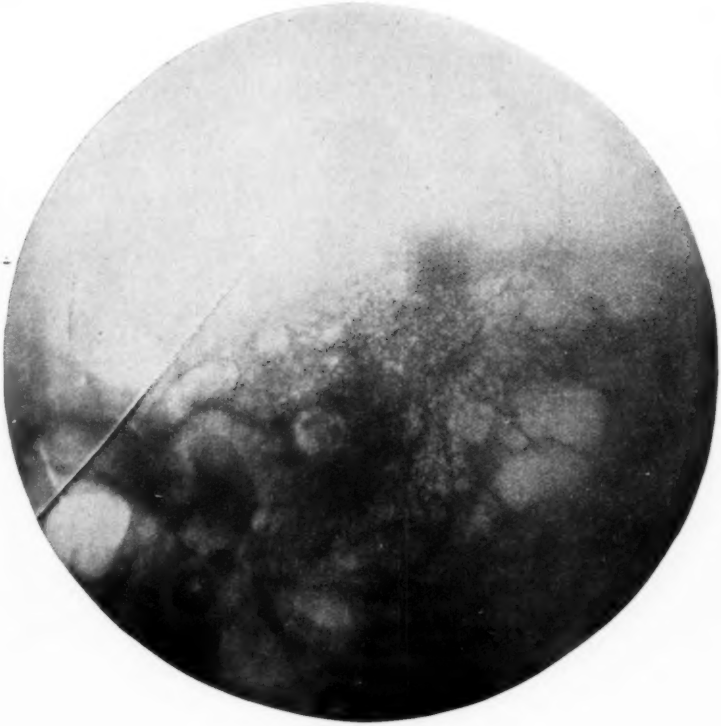

FIGURE 4.

Case 2.—Left mastoid.

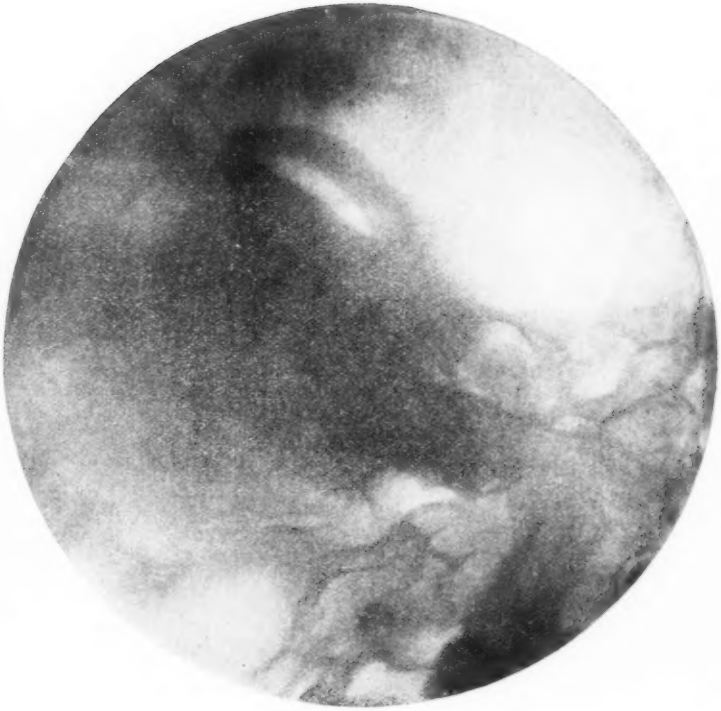

FiGURE 5.

Case 3—Right mastoid.

FIGURE 6.

Case 3.—Left mastoid.

FIGURE 7.

Case 4.—Right mastoid.

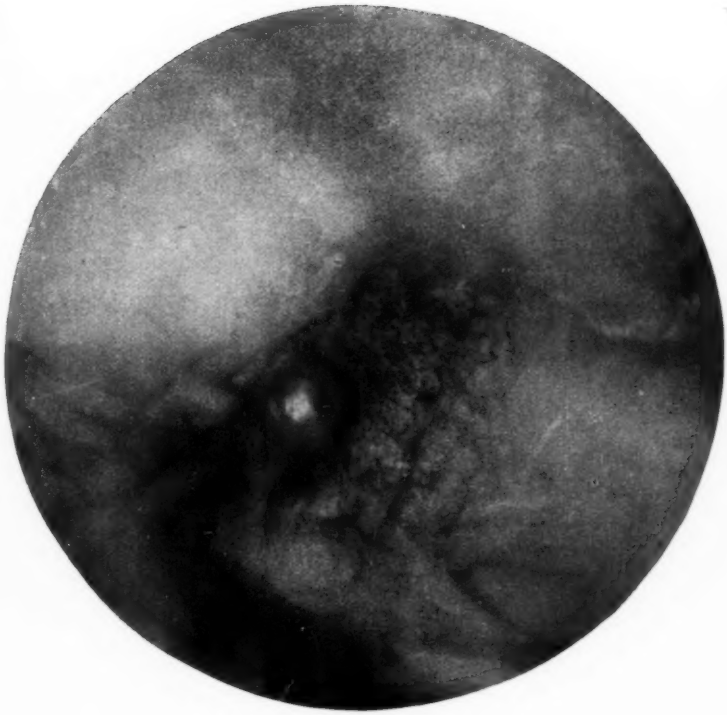

FIGURE 8.

Case 4.—Left mastoid.

XL.

THE STANDARD TONSILLECTOMY.*

By John Rice Fletcher, M. D.,

Chicago.

The history of operations upon the faucial tonsils is of doubtful credit to our specialty. Up to a few years ago tonsillotomy was universally practiced. Certainly up to as late as 1910 the best European authorities frowned upon tonsillectomy. Since then many have been converted to it. Tonsillotomy still prevails to no inconsiderable extent among us, partly because some operators will not change, but largely because many incompetents undertake this work upon the ground of its simplicity. As a matter of fact, an exquisite tonsillectomy is not beneath the dignity of the most highly gifted surgeon. On the contrary, those familiar with after-results will doubtless agree with me that the operation requires so much special training that even very able surgeons, as a rule, do not perform it acceptably. This is hardly to be wondered at since, although we have what may be properly called a standard operation, namely, instrumental dissection, we are by no means of one opinion how it should be done. In other words, the technic is not standardized. Until it has become so, my opening statement must remain true. Have we not a large number of advocates of the finger dissection? If crudeness, great trauma and the danger of infection are not enough to condemn it, certainly ten per cent of failures should. Up to a very recent date there were but two groups: the finger, and the instrumental dissectionists. This may be called the healthy hopeful period, because the instrumentalists were gaining fast. Their work was constantly improving. Not only did each try to excel the other, but also tried to excel his own work. In this frame of mind speed unfortunately stood high in favor, opening the door to the next step,

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the Sluder method. With the utmost deference and respect, not only to the author of this method, whom we all honor for many other reasons, but also to my Chicago colleagues, who are its ardent advocates, I must say that, to my mind, this is a great step backward. Speed is its greatest recommendation. If the speedy removal of the tonsil in its capsule constituted a tonsillectomy, nothing could equal it. A perfect dissection embraces so much more, that there can be nothing like uniformity in a single operator's work with this method. That it is a better operation than a good dissection few will claim; that on an average it fails in ten per cent of cases is admitted. Failure spells the reason for discarding it. One who acquires a good technic with forceps, knife, scissors, and snare does not fail. One case in ten is one case in ten too many. When this becomes the edict of the specialists, the casual operator in this field, be he general surgeon or not, must be bold indeed. Until we have fought our fight to a finish and speak with but one voice, authoritatively, any may infringe who will. For this reason a call to the colors of the two camps who alone are worthy of serious consideration now, the advocates of a perfect dissection and the Sluder method, seems to me timely. When we can agree upon a technic which completely removes the tonsil in its capsule, does not open the aponeurosis of the superior constrictor muscle, does not injure the palatoglossus or palatopharyngeus muscles, which conserves every bit of the membrane reflected over the tonsil, which prevents fusion of the three muscles named and leaves a linear scar in a rudimentary fossa, which does not injure the voice and which lessens greatly the frequency of secondary hemorrhage, we will have achieved the ideal, in the light of our present knowledge. This is not a dream, but is being done uniformly by many who do the instrumental dissection—and I believe uniformly by them alone. I do not wish to be understood as saying that each case by any operator is as good as another by the same operator, but I do mean to say that all cases can be so well done that none of them can be called anything but good. Even those engaged in the correction of speech defects can have no objection.

I will give you in detail the technic of an instrumental dissection which seems to me to fully accomplish the desirable features enumerated above, without the least insistence upon

its being absolutely followed. When the last word has been said, each operator will put individuality in his work. This is the art of surgery. Just so long as it is not mechanical, one will excel another. This art can, however, be reduced so nearly to science that, upon the whole, little will be left to be desired, from the present point of view.

In the first place, it is desirable that the operation shall be as bloodless and painless as possible. The first in order that the operator may see every detail. The second needs no comment. For the accomplishment of these purposes the following formula will be found good: Cocain hydrochlorat, one grain; adrenalin solution, twenty minims; normal salt solution, eighty minims. Of this not to exceed ten minims to a tonsil may be safely used, as follows: With a hypodermic syringe, the needle of which is bent at an angle of about sixty-five degrees, make blisters under the membrane just as they are made under the conjunctiva in eye operations—first, over the insertion of the anterior pillar; second, at its center; third, just above the mouth of the superior crypt; fourth, at the upper half of the posterior pillar. I use this injection in all cases, both local and general. Its use in hundreds of cases in small children under general anesthesia has not shown bad effect in a single instance.

In local anesthesia a much larger quantity of half of one per cent novocain solution with five drops of adrenalin to the hundred may be thought better. The blisters are made as before, but larger.

Lately, at the suggestion of Dr. Shambaugh, I have used twenty to thirty minims injected behind the tonsil in addition to the blisters. This seems to give more complete anesthesia. The first formula is more useful for blood checking under general anesthesia.

The tonsil is taken hold of only in that part containing the crypt mouths. For this purpose the smallest pattern Tidings forceps have no equal. Their grasp is small, suggesting slight traction. Just enough pull should be made to unfold the membrane, which, you will remember, passes over the face and posterior border of the anterior pillar, then over the face of the tonsil, making a distinct tuck or fold which extends upward and backward, following the arc of the palatoglossus muscle. There is a distinct demarcation between this mem-

brane and the tissue through which the crypts open. This line is very closely followed in dissecting the membrane from the tonsil.

Under general anesthesia let your patient lie flat upon an ordinary operating table, mouth well opened and held so with a mouth gag on the patient's right; head turned slightly to the left. Reflect a good light into the throat, inject first one and then the other tonsil, as above described, using the index finger of the left hand as a tongue depressor. Grasp the tonsil and lightly draw it out as above mentioned. Begin the incision at the lowest part of the plica tonsillaris, carry it upward just over the mouth of the superior crypt. Here is a danger point. If the incision is carried too far medialward the outline of the posterior pillar will be changed from an arch to an angle. In other words, it will have been cut, perhaps completely through. If, however, the tonsil is moved in the direction which brings into view the whole of the membrane of the posterior pillar, the incision may be safely carried around this point and downward to the lowest part of the tonsil. Beginning now at the starting point, carry the incision down to meet the other end. This completes the cut. Now free the membrane from the capsule. I usually do this with the back of my knife, which is, as you see, slightly, very slightly, hooked. Enter the fossa by pushing the membrane over the upper pole of the tonsil with the flat or back of the knife blade until the bluish aponeurosis of the superior constrictor is seen. Here begins the blunt dissection. Slightly curved round pointed scissors are used for this purpose—Simms' uterine scissors, in fact. With a slight downward and backward push the upper part of the tonsil is freed, in the meantime pulling this part of the tonsil down so that the point of the scissors never goes beyond the sight. The whole anterior portion of the tonsil is now liberated by making a rotary motion with the scissors forward and toward the tongue base, provided it can be done with but little force. If not, the case is not suitable for blunt dissection and must be done with scissors, cutting or rather nipping the adhesions close to the capsule. Two-thirds of the tonsil are now free, making it more movable.

The most painstaking part of the operation remains to be done, namely, the separation of the fibers of the palato-

pharyngeus muscle from the capsule, into the posterior third of which they are directly inserted. This is usually best done by sharp dissection with the scissors, following the capsule very loosely, or even nipping slightly into it rather than in the other direction, as none of the muscle fiber can be spared and they are prone to contract. After this is finished any remaining adhesions at the lowest portion of the tonsil are severed. The dissection is complete when the tonsil droops over the pyriform fossa. The snare here shown is now used. Pass the forceps through the loop, taking hold of the upper part of the tonsil, pass the loop over the tonsil, but do not close it while the canula is horizontal. This will certainly take a part of the posterior pillar which you have so carefully saved, and not infrequently take the uvula also. If, however, the handle of the snare is lifted upward and the loop is so placed that it cuts from below upward, these faults cannot occur. A loop much larger than the circumference of the thumb joint is dangerous. Any tonsil will go through this size, and the pedicle which it has to cut is about the size of the little finger. When during the dissection a vessel is cut and there is considerable bleeding, tie it with a catgut at once, then proceed. If you wait until the tonsil is out, you may have no little difficulty in finding the bleeding point. The ligature is easily tied when one learns the trick. I would like to call your attention to this snare, the separable ends of which increase its usefulness. The authorized manufacturers are F. A. Hardy and Company and V. Mueller and Company.

If I have been overbold in presenting the technic of my operation, I will confess that the ultimate result and praise from others have led me to believe that it has merit. A real desire to add something to the sum total of achievement in our specialty has urged me on. I would not have you think that I regard it as better than all others, but hope it is worthy of your consideration.

In conclusion, allow me to place emphasis on the following points:

First, save all the membrane possible.

Second, make your incision entirely around the tonsil.

Third, employ sharp dissection rather than force, because the weakest tissue will yield to the latter, whether it is muscle or connective tissue. In case of dense adhesions, neither

blunt dissection, the Sluder instrument nor any modification of it will pass through this tissue by choice. Just in these cases the greatest skill is necessary, and I would remind you that this is acquired by close attention to every case.

Fourth, beware of the posterior pillar. It is here that damage is most frequently done.

Fifth, remember that the snare is not an innocent instrument which cuts always where it should. On the contrary, it will cut just where you place it and will take into its fold all that comes in its way.

Sixth, last and most important, see all that you do. If only a few drops of blood are in the way, have them sponged out. No suction apparatus is necessary. It will be observed that I use no tongue depressor.

Under local anesthesia there is no difference except that the patient sits before you and no mouth gag is used.

XLI.

LOCAL VERSUS GENERAL ANESTHESIA IN NOSE AND THROAT OPERATIONS.*

By Joseph C. Beck, M. D.,

Chicago.

In presenting this subject for your consideration the writer wishes to make it clear at the outset that it represents a statement of facts on the practical application of the various methods of anesthesia, based upon personal experiences and observations, in the past fifteen years, and not a scientific treatise on anesthetics and anesthesia.

Many details, although important, must be omitted, owing to the time limit; consequently, I shall confine myself to the most essential matters in the criticisms of the various substances and methods used in anesthesia in nose and throat operations.

Local Anesthesia.—To Kohler and cocain belong the great credit for local anesthesia, and its discovery and application in nose and throat work have brought about a great progress in this field of surgery. By its means it is possible for most nasal and throat operations to be performed in the offices, a factor which still encourages many operators to perform their operations under local anesthesia.

On account of the possibilities of cocain poisoning, there has been and is a demand for substitutes, of which tropococain, alypin, eucain, beta eucain, novocain, stovain, quinin and urea hydrochlorid are some of the most important that have been recommended. In addition, it was found that the local applications of solutions of adrenal gland extracts aided the anesthetic effect as well as prevented the rapid absorption of the poison. Up to the time that novocain was brought forward as a local anesthetic it had been our experience that none of the above mentioned substitutes did the work as well

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as cocain, and even now we find that in some cases we must resort to the latter to get anesthetic effects. In all our experience I remember but one distinct case of cocain poisoning from application of a five per cent solution in a throat operation, this occurring in a boy nine years old, with perfect recovery. Besides this case we had a few cases of overstimulation. It is our custom to employ a twenty per cent solution, swabbed carefully over the mucous membrane, and subsequently to fill the nasal cavity completely by means of the kite-tail shaped tampons (Fig. 1) saturated with a five per cent cocain solution to which are added a few drops of adrenalin solution, 1/1000. In septum and throat operations we employ the injection of novocain, one or two per cent solution, and never make use of the pure cocain. In external operations, as sinus operations, nasal plastics, resections of a protruding cartilage of the septum, or operations on the larynx and pharynx, the nerve blocking method of anesthesia, associated with the Schleich method of infiltration, has given us excellent results.

Spinal Anesthesia.—Several years ago, when Jonnesco visited this country and demonstrated spinal anesthesia by means of stovain solution, I operated upon three head and neck cases by this means, but found the anesthesia not at all satisfactory.

The opening of an abscess or resection of some small growth can very often be performed by the application of a spray of ethyl chlorid without any sensation to the patient; besides, it can be reapplied as often as necessary without much harm to the tissues. Particularly valuable is this method for opening furuncles about the nasal vestibule and external ear.

General Anesthesia.—Under this head we consider:

1. Ether.
2. Chloroform.
3. Nitrous oxid.
4. Alcohol, chloroform and ether, or ACE mixture.
5. Bromid of ethyl.
6. Chlorid of ethyl.
7. Somnoform.
8. Morphin.
9. Scopolamin.
10. Hyoscin.

From 1895 to 1901 it was our custom to employ chloroform as the general anesthetic in preference to ether, and I can unhesitatingly state that the results were much more satisfactory from the anesthetic and after-effect point of view. We never had a death from its use, but we did have one from ether. Nevertheless, following the general cry against chloroform, we gave up its use, and now employ it only in rare instances. We use it almost exclusively in infants, especially in cleft palate operations. The anesthetic that we employ is ether, and without going over the past history of its application, I will describe the method that we now use as a routine in nasal, mouth and throat operations.

Nasal Operations.—The patient is anesthetized primarily by either the drop method or by placing two or three ounces of ether into the rubber bag and holding the rubber mask firmly over the nose and mouth (the rebreathing method, as recommended by Rovsing). The patient is encouraged to breathe deeply and regularly. In children crying causes vaporization of the ether by rhythmic distention and collapse of the bag. As soon as the patient is well under the primary anesthesia and the pupils are contracted, we sometimes insert a tracheal catheter through the larynx, by the method suggested by Jackson (the head turned back sharply and introduction aided by means of Jackson's or any other laryngeal spatula). The vaporized ether, which has been properly warmed and filtered, is allowed to enter the tracheal catheter by attaching it to the rubber tube coming from the ether apparatus. This apparatus, which was perfected by Mr. Walreich of V. Mueller & Company, according to my ideas, is the outcome of much labor and expense on their part, and I desire to express my appreciation to them at this time. We have tried out almost every apparatus on the market and three of our own devices and found them all defective in one way or another. It is essential to have a suction apparatus in connection with the pumps, and these should work independently as to the degree of power, for that has been the most difficult matter to perfect in the apparatus. The objections to the intratracheal method are the management of the laryngeal speculum and the possibility of irritating the larynx and trachea by the catheter. Again, the passage of the cathe-

ter consumes additional time. The other method is to allow the ether to pass directly into the mouth or pharynx and to be inhaled by the patient. The latter is the method most frequently employed by us.

We employ suction in order to keep the nasal cavity free from blood, as well as to prevent it from flowing into the pharynx. To do this effectively we have a rubber tubing that has at one extremity a trumpet-shaped piece (Fig. 2) which is intended to fit snugly into the posterior choanæ, and the other free end is attached to the rubber tubing going to the suction bottle. The introduction of this trumpet-shaped rubber tube is made as follows: Pass a rubber catheter or the writer's soft palate retractor through the side of the nose to be operated upon and withdraw through the mouth. Tie the thread which holds the bulbous end of the suction tube to the rubber tubing and withdraw it through the nose, as one would introduce a postnasal tampon. By drawing fairly firmly on this thread one will cause the bulbous end of the suction tube to fit into the choanæ. In order to facilitate the suction of the blood the anterior nares need only be closed for an instant, when the entire nasal cavity will become clear. It stands to reason that adrenalin has been freely used before operating. Two of these bulbous rubber tubes may be inserted at once; but as usually but one side of the nose is operated upon at a time, one can repeat the procedure of placing the bulbous rubber tube into the other side and temporarily tampon the operated side to prevent oozing.

Mouth and Throat Operations.—After the primary anesthesia has been effected as described in the nasal operations and the mouth gag applied, the patient is made to breathe through a curved metal tube which is attached to the rubber tubing leading from the ether bottle. Suction is accomplished by means of rubber tubing whose end is cut slightly oblique to prevent it from attaching itself too firmly to the tissues. The regulation of the amount of ether or suction required is accomplished by two independent cut-offs to the pumps. It is estimated that about twenty per cent of ether is required to keep a patient anesthetized, and this measurement is made approximately by the size and number of the air bubbles that are seen within the ether bottle. As to the warming of ether,

it is essential that it shall be surrounded by a water jacket which is kept at a constant temperature of 120° F. This insures a proper rarefaction of the ether. After the ether leaves the bottle it is passed through a chamber which has a temperature of 160° F., which further reduces the irritability. It is then allowed to pass through a gauze filter before it reaches the patient by means of rubber tubing. This rubber tubing should be as short as possible to prevent the cooling and condensing of the ether vapor.

Another method of ether anesthesia which we have employed recently in only a few cases, is by way of the rectum, according to Gwathney. The bowels are previously thoroughly cleansed by two high enemata; then six ounces of ether and two ounces of olive oil mixture are injected, permitting it to flow in slowly. In children one-half to two-thirds of the quantity of ether and oil are employed. It requires from one-half to one hour before the patient is thoroughly anesthetized, and it requires sometimes eight to ten hours for the anesthesia to disappear. It is essential if the patient appears to be too deeply anesthetized to remove the remaining solution at once and to wash out the bowels by means of very cold water. Washing the bowels with very cold water is absolutely necessary at the completion of the operation. The long sleep after operation has been our greatest objection. We have never had any trouble during or after the operation from its use, and the patient is certainly relaxed. In cases of mouth and larynx operations it has worked most admirably in our experience.

Nitrous Oxid.—About eight years ago I made a number of observations of operating, particularly in tonsils and adenoids, by employing an expert anesthetist to give the continuous gas anesthesia. I found that in a number of the children there resulted an inflation of the middle ear and stomach, and in one case—a child of a dentist who insisted upon gas—there resulted a stomach distention that caused nausea and vomiting for more than a week whenever the boy drank or ate.

The A. C. E. mixture we formerly employed with very good results, but since it cannot be vaporized and warmed we have abandoned its use.

The bromid and chlorid of ethyl and the somnoform are anesthetics that are of short duration, and consequently not suitable to present day methods of operating in the nose and throat. Besides, they have been found dangerous.

Morphin as a preliminary to ether anesthesia is well recognized. We employ it in combination with atropin only in very nervous individuals. Formerly it was given as a regular routine in each case, but we have noted since employing the open method of etherization certain symptoms of slow breathing and protracted sleep after the anesthetic that we do not find when we do not use it. The same is true in the employment of hyoscin.

Scopolamin and morphin we have used as anesthetics a number of times with excellent results, especially in cases where a general anesthetic could not be given. The foul breath so frequently observed, as well as the slow pulse, are among the objections we have found. Besides, it becomes necessary at times to employ some local and some general (gas or ether) anesthetic to keep the patient quiet enough to operate upon him.

After this statement of facts from our experience with these various methods of local and general anesthetics, I wish to call attention to one of the most important questions—as to the choice of a local or general anesthetic. I refer to the work of Crile on the effect of mental shock or fear on the repair of the tissues after operating and on the deleterious effect of this mental shock and fear on the nervous system. I am sure that most every operator has observed what we term postoperative neurosis, which is analogous to the posttraumatic or postpartum neurosis. I have made a close study of this condition and have found certain symptoms, behavior or statements made by patients during and immediately after an operation under a local anesthetic, which enabled me to say that in some particular cases there would be manifested more of this postoperative neurosis than in others. I refer particularly to the bravado actions when the operator declares that he has finished an operation. The patient becomes very much excited and talkative. Usually such a patient has within a week an attack of mental depression with insomnia, headache and all sorts of symptoms. I do not wish to say that one never sees the postoperative neurosis in general anesthesia, but certainly

not nearly so frequently. I further believe, based upon personal experience, that if one would follow the teaching of Crile in applying the method of anoci association, by blocking off locally the nerves by injecting novocain solution, one would see less of these neuroses following general anesthesia.

The next important point in the choice of a local and general anesthetic is the question of pain that is experienced even in a thorough local anesthetic. Pain is a relative phenomenon, and different individuals are more or less susceptible to it. Who does not recognize the hysteric individual whose sensitive mucous membranes can be manipulated with practically no response? Again, there are patients who during and immediately after operation under local anesthesia declare there was no pain; but to their immediate friends and relatives they make a different statement. A more important factor is the ability to do thorough removal of the pathologic processes and the proper stopping of the bleeding and dressing, which often is not possible in a very nervous patient. A fourth reason, and one that I have learned to appreciate very much, is that in addition to the strain put on the operator when working under a local anesthetic, he must at the same time act as his own general anesthetist by the suggestive method—a sort of hypnotism. The one great advantage in the local anesthetic is the saving of time for the operator as well as the patient; but I doubt very much whether this factor can be taken into consideration after having stated the advantages of the general anesthetics. I believe that as soon as the technic of general anesthesia is made more simple and can be considered as safe as it is now, more nose and throat operations will be performed under general anesthesia.

I have said nothing as to the importance of a general examination, physical and laboratory, as well as thorough preparation for the operation, believing this not to be within the province of this paper. I would, however, like to close by thanking Dr. Lynch of New Orleans for calling my attention to the routine employment of bicarbonate of soda, from thirty to sixty grains, in six ounces of water, by rectum, one-half hour before operation. The purpose of this is to prevent the possibility of an acetonemia from the ether absorption. This acetonemia is not serious unless the patient be a dia-

betic, as in that condition its use will often cause nausea and vomiting after the operation.

Since this paper was read in February, 1915, we have employed ether vapor anesthesia by the pharyngeal route in several hundred nose and throat operations without a single mishap. We wish to report some further studies on general anesthetics, with the presentation of an improved apparatus which is based upon our observations. We found that it required altogether too long a period for the patient to become anesthetized, and they did not recover consciousness soon enough after operation; however, no longer than from other means of administration of ether. We believed that it would be ideal if we could put our patient asleep by nitrous oxid and oxygen, gradually adding the ether until complete anesthetization took place, and when the operation was considered practically completed to discontinue the ether and finish with nitrous oxid and oxygen. In order to study this, with my associate, Dr. W. P. Haney, I went to Cleveland and Toledo, Ohio, where we had ample opportunity to work out the problem. The result of these studies was the construction of a new apparatus (Fig. 3), which is a combination of the former ether vapor and suction apparatus with the nitrous oxid and oxygen tanks added.

Instead of sending the vapor into the mouth and pharynx by means of the hook-shaped tube over the corner of the mouth, we pass the ether into the epilaryngeal space by means of a tongue depressor, carrying on it the supply tube for the gas and ether. This prevents the marked dispersion of the gases.

DESCRIPTION OF THE APPARATUS.

The stand, which is built very substantially and contains all the necessary parts, is easy to transport. The motor has a pump for air pressure and one for suction, each acting independently. This independent action is one of the most important factors for success. Flexible metal tubings covered with rubber lead from the pumps to two bottles which may be hermetically closed. One bottle is for the ether and contains a metal tube which terminates in a conical hollow button with about thirty small perforations. This tube can be pulled up or pushed down, depending on the concentration of ether

desired. The bottle rests in a metal container (water bath) for the purpose of keeping the ether from freezing. It is provided with a slit one-half inch wide, and is closed by a strip of mica, in order to show the quantity of water in this metal container as well as of the ether in the bottle. There should never be more than one inch of water in this container. This container with the ether bottle stands on an iron plate which contains a heating unit deriving its heat by electricity, in order to keep the one inch of water at a definite temperature. Another flexible metal tubing covered by one of rubber passes from the ether bottle to the mixing valve to join the supply of nitrous oxid and oxygen. The other bottle is utilized for suction of blood and secretion. The table also contains the two tanks, one for nitrous oxid and the other for oxygen. From these the supply pipes pass to the two rubber bags with pressure valves. From these bags the tubes pass to the beforementioned mixing valve. This mixing valve indicates the percentage of either of the gases alone or in combination, according to the position of the arrow point. With this mixing valve is connected the short tubing which goes to another heating unit (electric wire) covered by a metal chamber, and immediately attached to this is a glass chamber filled with loosely fluffed gauze to assure the purity of the gases. The supply tube to the patient passes from this glass chamber. The end of this tube has a slip joint which is easy to change from a mask to a mouth hook or tongue depressor. In order to make the motor as noiseless as possible, it and the two pumps are enclosed within the stand. The switch and air controls for both bottles are outside.

While we still adhere to the statement made in the paper in regard to the preference of a general anesthetic to a local, we desire to state that unless there is some distinct reason why a local anesthetic should not be used, we are never unwilling to employ it when the patient prefers it to the general. We recognize some of its advantages. Up to the publication of this paper the writer never employed pure cocain in nasal operations, with the exception of one case, and that was at the time when it was first recommended. It appeared to have a very bad effect on that patient. We noted, especially in the past two years, fibrinous exudate following a large number of nasal operations in which we employed local application of

cocain in five per cent solution by means of tampons. We were not able to explain it. We finally employed the cocain flakes rubbed on the mucous membrane, and since that time with the rarest of exceptions do we have any exudates forming. Hence, we employ that method of local anesthesia in all intranasal operations.

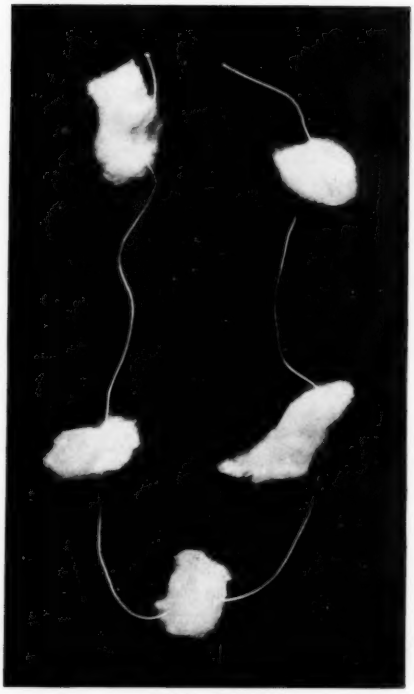

FIGURE 1.

FIGURE 2.

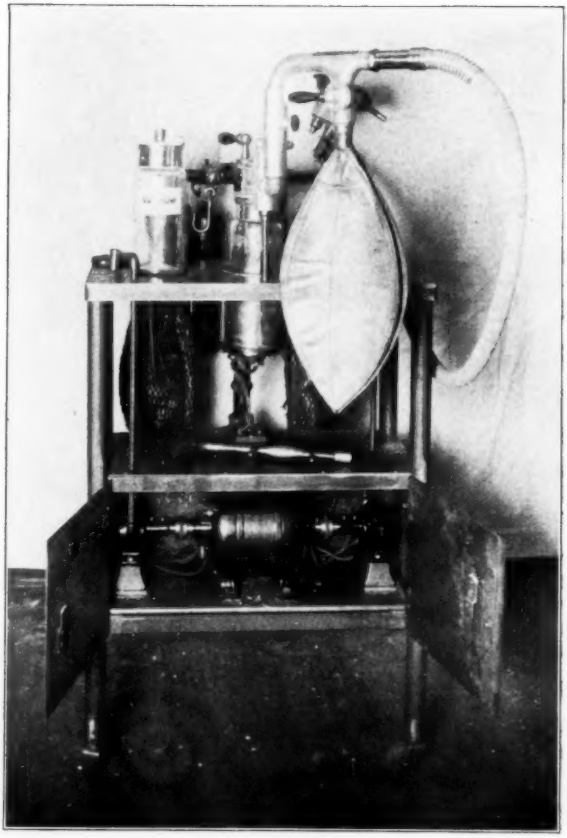

FIGURE 3.

XLII.

DECOMPRESSION FOR THE RELIEF OF CHOKED DISC FOLLOWING THROMBOSIS OF THE LATERAL SINUS.*

BY

HARRY FRIEDENWALD, M. D., AND J. W. DOWNEY, JR., M. D.,

BALTIMORE.

Choked disc is not an unusual occurrence in thrombosis of the lateral sinus, and is mentioned in all works upon the subject. Kipp[1] observed it in eight per cent of his cases, and Jansen[2] in fifty per cent; numerous writers have reported cases in which edema of the optic nerve was observed during the course of a lateral sinus thrombosis or following the ligation of the internal jugular vein for the cure of that condition. Until recently, a satisfactory explanation has not been given for this otitic complication; nor have we had any guide for the relief of the choked disc and the prevention of the optic atrophy and the resulting loss of vision which is certain to follow.

A case occurring in the practice of one of the writers, and reported some time since[3], is illustrative of the ordinary course and termination of these cases. A brief history of this patient is as follows:

The patient, a colored woman, aged thirty-two years, was first seen on February 20, 1906, for acute suppurative otitis media and mastoiditis on the left side. The patient did not consent to an operation until March 3d. There was pus under some pressure in the mastoid cells, and the bone was soft. The lateral sinus was exposed for about one-half an inch; part of it was found covered by granulation tissue. The tip of the mastoid was one large cell filled with pus and granulation tissue, on the posterior part of which the sinus was likewise exposed. After packing the latter cavity and withdrawing the packing there was a profuse hemorrhage

*Read before the American Otological Society at its Forty-eighth Annual Meeting, at Niagara Falls, June 4, 1915.

from the lateral sinus, though no violence had been used. It was controlled by packing with iodoform gauze. Her temperature before the time of the operation was about 99°, pulse, eighty to ninety-eight. On the following day the temperature was irregular, reaching 103.6° on the fourth day after the operation, while at the same time her pulse dropped on the second day after the operation to sixty-four, and remained below seventy for several days, except when the temperature was very high and the pulse rose to one hundred.

On the fifth day (temperature between 98.8° and 100.5°) abducens paralysis set in and mild optic neuritis was seen. From this period on the temperature remained normal, though the pulse continued slow during the entire first week, but the neuritis increased and rapidly became a typical choked disc with hemorrhages in both eyes, more marked in the left.

Seven months after the operation there was very little swelling of the discs, the veins slightly tortuous, but not very full, the arteries somewhat narrow, the color of the discs pink, and margins obscured; the condition of the left eye being more marked than that of the right eye. Vision right eye, 16/30; left eye, 10/100.

In this case, which was attributed to serous meningitis, we interpret the choked disc as resulting from the thrombosis of the lateral sinus following injury of its ulcerated wall and the firm packing required to control the hemorrhage.

In view of the serious damage to vision in these cases we determined to avert it, if possible, in the following case which, in the symptoms and early course, greatly resembles the first. When choked disc became definitely established, subtemporal decompression was performed. The history of this case and the result of the operation are as follows:

Eliza C., colored, twenty-five years old, was admitted to the Baltimore Eye, Ear and Throat Hospital, February 13, 1914, having been ill for ten days with discharge from and severe pain in and around the right ear. Her temperature was 103° on admission. She was extremely tender over the mastoid antrum and tip, and there was a profuse seropuru-

lent discharge from the right ear. The patient was operated on immediately for acute mastoiditis, and the operation disclosed nothing out of the ordinary. The mastoid was of the large cellular type and was filled with pus and granulations. The dura was not exposed at any point. The patient was returned to bed in good condition and her temperature on the following morning was 99°. She was not entirely comfortable, however, and by three o'clock in the afternoon of February 14th her temperature had again risen to 104°. The wound was reopened and irrigated and the temperature came down to 100°; but by the following afternoon there was another sharp rise to 104°. There were chilly sensations and the patient was undoubtedly septic. The temperature and the symptoms became more and more clearly those of lateral sinus thrombosis. On February 20th (six days after the mastoid operation) the internal jugular vein of the right side was ligated and the lateral sinus exposed and opened. This operation, likewise, presented no unusual features. The internal jugular was smaller than usual and the glands along its course were enlarged. The sinus, when exposed, was slightly flattened but not collapsed, and bled freely when opened. The condition was that of beginning thrombosis, or rather of phlebitis of the lateral sinus.

The patient made an uneventful recovery, the temperature returning to normal by the third day, following which there was never a rise of temperature above 100°. This almost normal course of the temperature is of extreme interest, in view of the later complications in the case. Cultures made at the time of the mastoid operation were negative. Later cultures from the mastoid wound gave a faint growth of the streptococcus mucosus.

Although the patient seemed to be progressing well, she was never quite comfortable, and complained a great deal of sore throat and headache.

Four days after the operation she had severe headache in both the frontal and occipital regions. Six days following the operation she complained of poor vision. An ophthalmoscopic examination made at this time disclosed blurring of the edges of the optic nerves, and fullness of the veins of the fundus oculi. The condition was more marked in the right eye than in the left. For two days, slight edema had

been observed in the neck and the right side of the face, most marked around the eye. This was transient and had disappeared on the sixth day after the operation. The swelling of the optic nerve increased rapidly, the papillæ becoming markedly elevated, the retina edematous around the nerve entrances and the veins enormously dilated and tortuous. On March 4th small hemorrhages were noted in the right retina. The choked disc was at all times more marked in the right eye than in the left. Vision tested at this time showed: right eye, 16/40; left eye, 16/60, and it was found the same at all examinations made before the decompression operation. The visual fields for white, blue and red were concentrically contracted about ten degrees in each eye. From March 7th on to the time of the decompression there were no changes noted in the condition of the eye grounds. A complete neurologic examination, made at this time, disclosed nothing of interest. The Wassermann reaction was negative. The blood pressure was equal to 134 mm. Hg. The leucocyte count, made several times, was normal (from five to six thousand) and the differential count showed normal proportions. Urinalysis showed nothing abnormal.

The patient complained continually of headache, more severe when she sat up, located both in the frontal and occipital regions. Her temperature chart showed but slight variation from the normal; there was usually a rise to 99° in the afternoon; the temperature rarely reached 100° and never rose above. The average pulse rate was eighty, and it was never below seventy, rarely above ninety.

On March 14th (three weeks after the operation upon the sinus) a subtemporal decompression was performed by Dr. Charles Bagley, Jr., who has given us the following notes of his findings:

"March 14th, 1914. Right subtemporal decompression. The usual approach was made through the temporal muscle, and a fairly liberal bony opening made. The dura, when exposed, was found to be tense, and when incised permitted cerebrospinal fluid to spurt freely. There was a great excess of fluid and bulging of the cortex. After evacuation of a considerable amount of the fluid, the cor-

tex ceased bulging. The wound was not drained. The closure was made in the usual manner. Operative recovery was good."

From the time of the decompression operation the patient made a rapid recovery. The choked discs rapidly subsided, the hemorrhages in the right fundus were absorbed, and the veins resumed their normal caliber. The patient no longer complained of headache, and on her discharge from the hospital, April 1st, her vision in right eye had improved to 16/20; in left eye to 16/30. Three months later it was impossible to find any ophthalmoscopic evidence of previous disease of the optic discs, and her vision was 16/16 with each eye.

At the time of this operation we were ignorant of any similar reports. We have since, however, found the article of Auerbach and Alexander[4], in which they described similar case, in which the decompression operation was performed. The article is likewise important for its references to other unoperated cases, and for the thorough discussion of the probable factor in lateral sinus thrombosis responsible for the choked disc.

Auerbach and Alexander's case was that of a man twenty-six years of age who had a cholesteatoma of the left ear for years. He was operated on for lateral sinus thrombosis with choked disc, the symptoms having appeared five days previously. There were cholesteatomatous masses, perisinus abscess and a fistula leading into the lateral sinus. The internal jugular was tied and diseased sinus completely opened. The temperature fell within the next few days, but the choked disc increased and vision decreased so that the patient became completely blind in the right eye and almost blind in the left. The retina showed the appearance of an albuminuric retinitis, but the urine was normal. Three days after the operation a neurologic examination disclosed a paresis of the right abducens and the right facial nerves. There was no headache, no vomiting, no slowness of the pulse. Diagnosis: Meningitis serosa, and therefore it was determined to puncture the right lateral ventricle from Keen's point. The result was negative. The wound was enlarged backwards and the cerebellum was examined for abscess, but without result; there was no improvement in the condition.

Eleven days later a left subtemporal decompression was performed, and on the following day the pupils responded to light. Eight days later the patient could count fingers at one meter, and in another week the vision in right eye was 1/15; left eye, 1/4, with a decrease in the swelling of the disc and the absorption of the extravasations of blood.

The patient died three and a half months later from an erysipelatous infection of the decompression wound.

The authors recognize the great difficulty in explaining choked disc in lateral sinus thrombosis, especially as the choking does not decrease after a successful operation, but increases. They refer to Bartels[5], who has reported such cases, and was unable to give a satisfactory explanation.

Bartels' cases resemble the case of Auerbach and Alexander. The choking of the disc was not as marked before operation, and reached the climax in the second to the fifth week after the operation, and not in a few days after the ligation of the jugular. The vision was not so markedly reduced, and only in one case was there a paresis of the facial and abducens nerves.

Auerbach and Alexander incline to the mechanical explanation of choked disc in cases of sinus thrombosis, as the result of interference with the venous outflow. They refer to the work of Rüdinger, who has shown that the superior longitudinal sinus in more than half the cases turns to the usually larger right lateral sinus, while the straight sinus commonly turns to the left. The two lateral sinuses are unequal, as are the internal jugulars. These facts are corroborated by Macewen.

Spalteholz described the superior longitudinal sinus as frequently emptying its larger right branch into the right lateral sinus, its smaller left branch into the left. Almost as often it empties itself undivided into the right lateral sinus, very rarely into the left. The straight sinus at times enters undivided into the left lateral sinus, but it generally divides, its larger left branch emptying into the left, its smaller right into the right lateral sinus. Toldt and Henrica and Kikuchi have likewise studied these variations, with similar results.

In their own case, Auerbach and Alexander assume

that the closure of the left lateral sinus resulted in interference with the venous outflow from the interior of the brain, with a damming up of blood and with consequent edema of the brain, increase of intracranial pressure and its resulting symptoms.

Ruttin[6] gives a similar explanation. He thinks that when the right sinus is closed the surface circulation suffers to a lesser degree than when the left is closed. The choked disc is less marked and altogether milder. Ruttin further thinks that choking of the disc occurs with much more frequency in thrombosis of the lateral sinus than in any other pyogenic brain condition. In twenty-three cases of temporal abscess, he saw choked disc in only three of the cases. In twelve cases of cerebellar abscess, he found choking in two cases, but in thirty cases of sinus thrombosis, he found eight with choked disc. He attributes the choking in cases of cerebellar tumors to the same mechanical obstruction as that causing the condition in lateral sinus thrombosis—viz., an engorgement of the cavernous sinus as the result of a regurgitation of blood from the superior and inferior petrosal sinuses, in turn cut off by obstruction in the lateral sinus, which may be due to pressure, as in the case of tumors, or a thrombus. He is sure that serous meningitis did not exist in his cases, and, therefore, thinks that the condition of the optic nerve, and the facial and abducen paresis sometimes seen, is undoubtedly due to mechanical causes; and this is further substantiated by the occurrence of edema, unilateral headache and other symptoms of engorgement. Why it should occur in one case and not in another can only be conjectural, but may be best explained by the anatomic difference which undoubtedly exists in different individuals.

That tying of the right jugular vein in cases where it is much larger than the left may produce fatal cerebral edema has been shown by Linser[7]. He found two such cases reported, and added one of his own; and he likewise referred to the experiments of Reisinger[8].

It appears to the writers that the explanation of venous engorgement is most satisfactory and that the great variation in vascular distribution accounts for the occurrence of choked disc in one case and its absence in others.

In our first case we are not of the opinion that there was a thrombosis of the lateral sinus before the operation, and in the second, symptoms of thrombosis did not arise until several days after the mastoid operation. Unfortunately, no ophthalmoscopic examination was made before the signs pointing to visual disturbance appeared. But when first seen, the ophthalmoscopic changes were evidently only beginning, and their rapid increase was subsequently watched day by day: therefore the thrombosis in the lateral sinus may but partially interfere with the current of blood, and the complete stoppage may occur only when the jugular vein is tied. This was probably the case in our second patient.

We do not believe that there was a meningitis in either of the cases we have reported. The temperature, the pulse and the general clinical conditions would seem to contradict the existence of any inflammation, however mild. The condition of cerebral and meningeal edema should, therefore, it appears to us, not be termed serous meningitis. In some cases there are other signs of venous stasis beside those in the eye grounds, for in our second case there was definite edema of the face and neck; also the very satisfactory result of the decompression operation in our second case and in Auerbach and Alexander's is still more convincing proof of the noninflammatory character of the edema. Aside from the explanation they give of an interesting condition, these cases serve as a valuable guide in dealing with the condition in the future.

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XLIII.

THE INFERIOR TURBINATE.*

By John A. Cavanaugh, M. D.,

Chicago.

The inferior turbinates are two in number, one in each nasal cavity. They are the largest of the turbinated bodies, attached by their long axis to the lateral wall of the nose in its lower half, from the posterior part of the vestibule to the choana narium; and they extend into the nasal cavity from the lateral wall like an awning. They are made up of bone and soft tissue, and arise from a separate center of ossification which appears between the fifth and seventh month of fetal life. They are concave on their outer and under side, and convex on the upper and inner side. At birth the turbinates closely hug the floor and lateral wall. They are twenty-two to twenty-six millimeters long and four to eight millimeters from the free edge to the lateral wall attachment, their thickness being two to four millimeters. From the opening of the nostril to the anterior end of the turbinate measures eight to ten millimeters. From the cribriform plate to the lower edge ten to twenty millimeters, and to the attached edge fourteen to sixteen millimeters, and the distance from posterior end to anterior wall of eustachian tube is six to eight millimeters.

I am not of the opinion that a part of the inferior turbinate forms a portion of the lateral nasal wall, as all anatomists would have us believe, for I have not been able to find even in the fetus the signs of a suture, which, to my mind, one would find if it helped to form a part of this wall. I believe the bone develops in the rudimentary turbinate and unites to the lateral wall, thus causing a thickening of this area, and with the antrum developing on one side and the nasal cavity on the other causes the lateral wall to thin out

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and gives it the appearance of a part of the inferior turbinate bone.

There seems to be but little change in the relations of the inferior turbinates and the surrounding walls from birth to the fourth year, but after this time there is a greater prominence of these bodies. I have measured the thickness of the mucous membrane in children from four to ten years, and found it to vary from one to three millimeters. All turbinates are thickened in the posterior portion. The bony portion of the inferior turbinate at birth is well developed, being from eighteen to twenty millimeters long and from two to four millimeters in width. The free edge of the bone is corrugated and measures about two millimeters thick; as it approaches the attached portion it thins out from one-half to one millimeter in thickness.

The adult inferior turbinate does not vary from that of the child except in its size, being much larger. Its length varies from thirty-eight millimeters to forty-eight millimeters. Some are long and narrow, others short and wide. Some extend into the nasal cavity in a slant from the lateral wall, others in a scroll effect, while others lie almost on a horizontal plane. It is attached to the lateral wall in a curve, the curve being greatest in its anterior attachment. The free edge of the turbinate, with the membrane removed, at the anterior part is from twelve to sixteen millimeters from the floor; the free edge of the posterior part, eight to ten millimeters from the floor. From the cribriform plate to upper attached edge of turbinate, twenty-two to twenty-eight millimeters, and to the free edge, thirty to fifty millimeters.

From the opening of the nostril to the anterior end of the turbinate measures from sixteen to twenty millimeters. The width of the bony part of the turbinate varies from twelve to sixteen millimeters. The free edge of the bony turbinate is from two to three millimeters thick, and is the dense part of this body. The area from this edge to its attachment is very thin and indeed in some specimens entirely absent.

This body is covered by mucous membrane, which is closely adherent at its free border. This membrane varies in thickness from two millimeters to nine millimeters, depending upon existing conditions. The surface of this membrane is composed of several layers of epithelium, the most superficial

of which is of the ciliated columnar variety. Below these cells is the basement membrane, which contain small vessels for the nourishment of the epithelium; it is pierced by minute canaliculi and is .010 to .020 millimeter in thickness. Below the basement membrane there is a layer of adenoid tissue, more marked in some cases. Below the adenoid layer are the glands and venous spaces which form the bulk of the mucous membrane. The venous sinuses have rather thick walls which contain considerable muscle tissue. Between these venous channels are numerous bundles of elastic fibers which arise from the superficial layer of the periosteum and end in the adenoid layer. Subdividing and reuniting, these fibers form an elastic network between the glands and cavernous sinuses. Bundles of plain muscle fibers are found around the veins and acini of the glands, as well as running independently through the mucous membrane.

Racemose glands abound in this region, being more numerous in the posterior part of the turbinate. The cilia have a waving motion toward the pharyngeal space.

The blood supply is derived from branches of the anterior ethmoidal arteries anteriorly and the sphenopalatine artery posteriorly. Small branches are given off of these arteries which run out vertically towards the surface and branch extensively in what is called the adenoid layer, and from these the blood collects into small capillaries which open into the large cavernous spaces. From here the venous blood is carried away by veins which follow the arteries.

According to T. W. E. Rose[1] of Edinburgh, the nerve supply is derived from the two inferior nasal nerves given off from the anterior palatine nerve. These emerge from two minute apertures in the vertical plate of the palate bone; the upper branch at a level between the middle and inferior turbinate, the lower one immediately behind the posterior end of the inferior turbinate. The upper one supplies the superior and innner surface, while the lower supplies the under or antral surface. They enter the posterior end of the turbinate and run forward near the bony surface in company with the arteries and veins. Numerous branches are usually given off, which run more or less obliquely in a very tortuous manner toward the surface.

Henry J. Hertz[2] in his article on the lymphatic system tells

us they are very rich in this body, and the capillaries form a network of unequal meshes of irregular size, anastomosing over the entire nasal mucosa and forming a perfectly closed system of vessels. There are two sets of collectors, the anterior and posterior trunks; the anterior anastomoses with the vessels of the external nose and flow to the submaxillary and deep cervical glands. The posterior, which is the most important lymph tract, drains back into the lateral wall of the pharynx and then to the submaxillary, retrolateral, pharyngeal and deep cervical glands.

The physiology of these bodies is thought to be very important factors in warming, moistening and purifying the air, because of the cavernous tissue which forms the greater part.

These bodies have received considerable recognition, but to my mind very little compared to what they should receive, for I believe they mean more to the human economy than most rhinologists would have us believe.

Having studied the anatomy, histology and physiology of these structures, we are now in a position to understand the line of treatment necessary in dealing with their enlargements. Histologically it is a difficult matter to find a truly normal turbinate. Macroscopically I would call a turbinate normal which does not impinge upon a foreign part.

To my mind there are only three types of turbinates which attract our attention, excluding, of course, the malignant and nonmalignant tumor types. These are the intumescent, hypertrophy of the mucous membrane, and hypertrophy of the bony part, the mucous membrane being practically normal.

Personally, I believe the rhinologist is responsible for much of the slaughtering of the inferior turbinate, and I believe it time we should accept a means of caring for these conditions in a way that will not interfere with the normal function of these bodies. I consider it a great exception where an inferior turbinate should be totally removed, and cannot agree with Dr. Dudley S. Reynolds[3] and Drs. E. Moraweck and G. C. Hall,[4] Louisville, in advocating its removal in practically all cases, and of preserving the nasal septum. Moraweck and Hall contend that they often find large turbinates on the side of the concavity and on the other side an atrophy, and when these structures are hypertrophied they should be attacked radically. A turbinate, even though it may look path-

ologic, will always have some function and should be left untouched. It would be natural to find a large turbinate on the concave side of the septum, and an atrophied one on the convex side, as the turbinate on the concave side is overworked and we have a compensating hypertrophy, while on the obstructed side there is lack of work and, according to the physiologic law, an atrophy.

The septum should always be our point of attack, if by so doing we can preserve a turbinate and accomplish our purpose.

The intumescent or congestive turbinate is a vasomotor relaxation of the muscle fibers of the cavernous spaces, and is the type we are called upon most often to relieve. Many of these cases are due to systemic affections. The anemias play an important part. I have had many cases which impressed upon me the importance of a systemic cause; one especially, a young woman, who had two large intumescent turbinates. I had decided to operate upon them, but in the meantime she was operated on for chronic appendicitis, and after that she told me her nose had opened up. I have seen her since, and the turbinates are as normal as they could be and causing absolutely no trouble.

Operations on the turbinates are many, but the cautery seems to be the one most universally used. I will not discuss the chemical cautery, for, to my mind, it is not worthy of consideration. The galvanocautery is of value only in the turgescent type. There are many advocates of this method, but personally I believe it has many faults. It gives the charlatan an opportunity to use it as a cure-all for nasal diseases, causing destruction of functionating membrane. It destroys normal tissue for some distance from the field of application, and it leaves a large area of nonfunctionating scar tissue with a great liability to a synechia. Drs. E. Fletcher Ingals and Stanton A. Friedberg[5] advocate this procedure, and I believe in the hands of such men the cautery has a place in selected cases.

Dr. Beaman Douglas[6] gives us his histologic findings i.. cases which he cauterized. He took specimens immediately, thereafter at intervals of forty-eight hours, one hundred hours, three hundred and sixty hours, and after complete healing. He also made like specimens in which an incision had been

made by means of a scissors and removed them at corresponding hours to the cauterized specimens.

Dr. Arthur Westerman[7] relates having carried on a like experiment, in which he examined the tissue after the galvanocautery was used, at intervals from one hour to five months.

The findings of these two men were practically the same, the epithelial and basement membrane being destroyed a considerable distance from the point of application of the cautery, while deep in the tissues cauterization was limited more to the area of the application. The basement membrane seemed especially sensitive and easily destroyed and did not redevelop. At the scar area normal mucous membrane was replaced by compact fibrous tissue and the surface covered by a thin layer of epithelial cells. The bone and periosteum were not affected.

Dr. Douglas advises cautery punctures, quarter inches apart, instead of the linear cauterization. After the scissors cut, the epithelium and basement membrane were normal, except where destroyed by the cutting edge. Through the courtesy of Dr. Joseph Beck, I examined a number of histologic specimens of turbinates after cauterization, and found they correspond to the findings of Drs. Douglas and Westerman.

Dr. Henry Horn[8] advocates making a small vertical incision at the anterior end of the turbinate and then separating the tissue from the bone; when this is done he passes the cautery point into the cut and back to the posterior part of the denuded area and then turns on the current and cauterizes from posterior to anterior. But here, again, the radiating heat would destroy too much tissue and defeat our aim.

Dr. A. H. Andrews[9] advises submucous electrolysis, but I believe that also destroys too much of the normal structures.

The sawing or cutting off of a part of the inferior turbinate and leaving bone exposed is unsurgical, for there is no other place in the body where one would allow bone to be exposed and trust to mother nature to cover it by granulations.

Many other methods, such as high frequence, carbon dioxid snow, and crushing are advocated, but time will not permit my speaking of them all. I wish to mention the one method which I believe is the only true surgical procedure to be followed in dealing with the inferior turbinated body, and one which is applicable to all forms of enlargements.

The operation which I perform on the turbinated bodies is similar to those advocated by Dr. Otto Freer[10] and Dr. Sidney Yankauer.[11] I inspect the turbinate carefully before applying adrenalin and cocain, to discern its relations to the surrounding structures; for if a mental picture of this condition is not kept in mind, the operation will fail in purpose, as after shrinkage of the turbinate the picture is changed. If the enlargement is limited to certain areas, deal only with those areas. Use a ten per cent cocain and 1/1,000 adrenalin chlor. If the entire membrane is at fault, whether it be intumescence or hypertrophy, I make an incision from behind forward at the lower and internal surface down to the bone, then a corresponding incision on the lower and outer side, which makes somewhat of a triangular piece of mucous membrane with its apex attached to the bone; with a Freer sharp elevator elevate the mucous membrane from the bone on the outer and inner side for one-eighth of an inch from the anterior surface all along the long axis of the turbinate; then take a Myles alligator biting forceps and bite out a part of the bone with the triangular mucous membrane area, which can be done with but little difficulty. When this is removed the Yankauer crotch forcep is used to draw the cut edges together to make sure that no tension will be necessary on the stitches which pull the flaps together; if there is none, apply stitches with a small needle, using silk instead of catgut, which I find easier to handle and remove.

When this is done, place on the under and inner side a piece of cotton or gauze to aid tissues in apposition and remove it in twenty-four hours. I have packed in some cases without sewing, but the results are not as satisfactory. Where the bone is hypertrophied, proceed as above, but remove more of the bony structure.

This form of dealing with the turbinate is surgical, and after a section is removed, whether it is turgescent, hypertrophy of bone or soft tissue, a structure is left which has practically no connective tissue to interfere with its normal function.

I wish to express my appreciation to Drs. Eycleshymer and Moody of the anatomic department of the University of Illinois for many specimens used in my research work.

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XLIV.

SOME STATISTIC OBSERVATIONS ON OTOLARYNGOLOGIC DISEASES AMONG NEGROES, BASED ON FIFTEEN HUNDRED CASES.

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Atlanta.

Racial peculiarities must ever remain a characteristic of disease. Whether such be due to climate, to civilization, to environments or hereditary influences, must be left to a further study of the human race.

In considering the diseases embraced under the term otolaryngologic we will find that the above statement is especially true. It is the purpose of this paper to call attention to the diseased conditions found in the upper respiratory tract among the negro race, based upon a study of fifteen hundred cases treated during the last few years at my clinic in the Atlanta College of Medicine, which was formerly the Atlanta College of Physicians and Surgeons.

The study of these cases will show us that the negro race is especially susceptible to certain diseased conditions and almost immune to others. This also is surprising, because the negro race is by no means noted for its cleanliness, and often its mode of living and home environments would lead us to expect a certain prevalence of infections and contagious diseases. A close study of these fifteen hundred cases will show some erroneous statements which have previously been made in reference to certain diseased conditions among the negro race.

That a statistic summary of these may be more clearly understood we have divided them into: (1) Nasal, (2) pharyngeal and laryngeal, (3) aural.

1. Nasal.—It is surprising how few negroes present themselves for a diseased condition of the nasal cavities. Out of

the total of fifteen hundred case only three hundred and forty-one came for consultation on account of some nasal disease.

The following is a summary of the pathologic conditions found:

Deviation of the columnar cartilages	1
Atrophic rhinitis (true ozena)	2
Hay fever	2
Acute abscess of the maxillary sinus	2
Deviations of the septum	2
Spurs of the nasal septum	3
Acute rhinitis	15
Purulent rhinitis in children	40
Acute frontal, ethmoidal and sphenoidal sinuitis	30
Chronic ethmoiditis with polypus	45
Syphilis—septum and outer wall	90
Hypertrophic rhinitis (inferior and middle turbinate)	109
Total	341

In studying these cases we are struck with some marked peculiarities. Spurs and deviations of the septum are extremely rare. This I believe to be due to two facts:

First, in the development of the maxillary bones you rarely ever see the high arched and contracted palate which is so often found associated with deviated septums. In the negro this is seldom seen, for a broad face, and consequently a broad palate, is the usual rule. This fact tends to substantiate Mosher's argument as to the importance of the premaxillary ridge in the causation of septum deviations.

In the second place, traumatism as a causal factor in septum deviations is almost universally accepted, but in the negro this is greatly minimized by the presence of a protruding brow and a soft flat resilient nose, which is less likely to show the marks of a violent encounter.

In the full-blooded negro I have never seen a deviation of the septum—i. e., to the point where one might observe a decided bend; and the only two cases which were seen occurred in mulattoes and gave a history of previous traumatism. This I consider quite remarkable that out of fifteen hundred patients only two show a deviated septum.

Acute inflammation of the frontal, ethmoidal and sphenoidal sinuses were seen in five cases, which was also quite remarkable in comparison to similar cases seen among the white patients. This I attribute to the fact that the nasal cavities in the negro are large and roomy, free from obstructions, and consequently offer a perfect drainage for all of the sinuses.

This but exemplifies the fact that acute sinuitis is largely dependent upon the obstructions offered to the natural outflow of the secretions from these cavities. There were only two cases of acute abscess of the maxillary sinus, both of which fully recovered through natural drainage.

Not a single case of chronic maxillary sinuitis was seen, which is also remarkable. While in the South we do not find this condition as frequent perhaps as it occurs in the North, yet we do have a number of cases that even come to operation. Negroes, as a rule, have the most perfect teeth of any race of people, and this may in a large measure be the cause of their freedom from antral disease.

Chronic necrosing ethmoiditis with polypus was found in sixty-five cases. This seems remarkable because the acute sinuitis was so rarely found. In nearly every case this condition was associated with a hypertrophy of the inferior turbinates. This hypertrophy was quite characteristic in that the mucous membrane over the turbinates was thick and leathery, presenting a peculiar gelatinous mulberry appearance, of a decided anemic color. This condition is quite prevalent among all negroes and yields readily to the treatment by means of the electric cautery. This gelatinous hypertrophy, when it involved the middle turbinates, very quickly passed into a condition of polypus.

Hay fever was seen in two cases, which in nowise differed from the same condition in the whites. Inquiry among my colleagues would lead me to say that hay fever is rare among the negroes.

Atrophic rhinitis was seen in only one case, and even here there was an element of doubt, with the possibility of its having a specific basis. This also is at variance with the theory of those who hold that a flat, roomy nose with large nostrils is the type most usually found where atrophic rhinitis exists, and for this reason they hold that such a nose predisposes one to this disease. The facts as stated by me certainly seem to controvert this theory.

Syphilitic lesions were comparatively frequent, and every type of this disease was represented. Unfortunately for this race of people, syphilis seems to have permeated its whole vital system. In a large public clinic one may observe all its various forms, both acquired and hereditary. Gummatous destruction of septum and turbinates, especially the middle, perforations through the floor of the nose and hard palate—these and every other manifold specific lesion can be found.

I wish to call attention to the frequency of purulent rhinitis in the very young. This always had a syphilitic basis and yielded readily to antisyphilitic remedies. This in a measure controverts the theory of those who hold that atrophic rhinitis is dependent upon a previous purulent rhinitis in children. If this was true we would certainly see very many more of the atrophic cases than are really observed in this race of people:

2. Diseases of the pharynx, epipharynx and larynx:

1. Vincent's angina	2
2. Complete atresia of the pharynx and naso-pharynx	2
3. Laryngeal paralysis	3
4. Pharyngeal diphtheria	5
5. Syphilis of larynx	10
6. Elongated uvula	11
7. Chronic granular pharyngitis	20
8. Hypertrophy of lingual tonsil	21
9. Laryngeal tuberculosis	23
10. Peritonsillar abscess	50
11. Acute diffused tonsillitis and epipharyngitis	40
12. Acute follicular tonsillitis and epipharyngitis	60
13. Adenoids	96
14. Enlarged faucial tonsils	152
15. Adenoids and enlarged faucial tonsils	296
16. Syphilis of pharynx and epipharynx	270
Total	1061

In this list there will be found only two cases of laryngeal paralysis, and both occurred on the left side as an adductor lesion. They recovered in a few weeks under the use of the iodid of potassium.

I have looked carefully for the various forms of laryngeal paralysis among this race of people because of the prevalence of syphilis in all its forms, especially since optic nerve atrophy is so very common, but so far these are the only case I have ever seen.

Diphtheria is an exceedingly rare disease among the negroes, when we realize the fact that during the last year only seven cases were positively recognized among the negroes in Atlanta out of a negro population of thirty-five thousand. Only five cases were seen by me out of a total of fifteen hundred who consulted the clinic for various throat maladies, and these presented themselves during the last three years. No case of nasal diphtheria was seen, although this form of the disease has been very prevalent in our city during the last few years. If insanitary living can be attributed as a cause for diphtheria, we would certainly expect to find the disease prevalent in the negroes. Consequently, there must be some deciding factor which affects more frequently the white race in this disease. More prominent than everything else stands the prevalence of syphilis among these people. It occurred two hundred and seventy times on the pharynx, tonsils, soft palate and epipharynx, in all its forms from the initial lesion (one case) to a gummatous destruction of all the tissues, and in one case even involving the bony vertebræ. It was by no means uncommon to have these patients present themselves with an entire destruction of the soft palate and even the hard. Usually these cases never present themselves until a decided destruction has taken place, always relying upon some home remedy to effect a cure and in this way allowing the ravages of syphilis to produce great destruction. It is in these cases of active gummatous destruction that salvarsan produces such marvelous results.

Syphilis of the larynx was not near so frequent, occurring only ten times out of the total number of cases. This differs somewhat from laryngeal tuberculosis, since twenty cases of this disease were seen. Tuberculosis is exceedingly prevalent among the negroes, and is one of the most fatal maladies which occurs among them. It is strange, therefore, that more cases of laryngeal tuberculosis are not seen in a large outdoor clinic, where large numbers of negroes come to be treated for every known disease. Several years ago the statement was

frequently made—and, strange to say, by some Southern laryngologists—that adenoids were rarely found among the negroes. The statistics here published would certainly disprove such a contention. The fact is, adenoids are almost as prevalent among this race as among the white, and since the medical inspection of colored schools has been instituted in our city we find our clinics crowded with colored children seeking to be operated upon for the presence of adenoids and enlarged tonsils.

3. Diseases of the Ear.—Aural diseases are not very frequent among the negroes. Out of the total of fifteen hundred patients, only one hundred and twenty-five consulted the clinic for some affection of the ears.

Following is a tabulated list:

1. Facial paralysis	1
2. Atresia of the external canal	2
3. Foreign body in external canal	2
4. Progressive deafness (socalled dry catarrh of middle ear)	3
5. Acute suppurative otitis media	5
6. Chronic catarrhal otitis media	6
7. Furunculosis of the auditory canal	8
8. Chronic suppurative otitis media	8
9. Eczema of the auditory canal	10
10. Otalgia from reflex causes, teeth, tonsils, etc.	13
11. Acute catarrhal otitis media	17
12. Tinnitus with retracted drums	24
13. Cerumen	26
Total	125

Middle ear inflammation is comparatively infrequent among the negro race. This is also true of the white race in our climate as compared with that which occurs in more northern states. However, middle ear disease is noticeably very rare among negroes, especially that form which is usually spoken of as dry catarrh accompanied with gradually increasing deafness. Out of this tabulated series there were only three cases of this kind, and in looking back on my clinical experience of fifteen years in the same clinic, I can recall but very few negroes who presented themselves on account of progressive

deafness. This, to my mind, can be attributed only to unusual free respiratory room in the nasal cavities and the almost absolute freedom from nasal obstructions. This latter condition is by no means a sine qua non as a factor in producing progressive deafness, as the histories of such cases will attest, but it certainly is a contributing cause and cannot be disregarded. The auditory canals in this race are usually very large, and seldom is it even necessary to use a speculum to observe the membrana tympani.

One class of cases mentioned in this list is worthy of comment and are quite numerous. These are the cases where the chief complaint is tinnitus and the only objective symptom found is a retracted drum. Functional testing always fails to elicit any positive results. They are always associated with chronic constipation and its attendant sequela—intestinal toxemia. It is not unusual to elicit the fact that their bowels have not acted for five days. A thorough elimination will speedily cure all these symptoms, which shows that the same is toxic in origin.

In conclusion I wish to say that all of these cases have been studied very carefully, and these observations have been made as representing my own clinical experience. It was stated at the beginning of this paper climatic influences and local environments may possibly play an important rôle in these statistics, which will cause such observations to differ from those of other southern confrères. However, this will certainly add to the sum total of our knowledge and produce further statistic observations along this line by men whose clinical opportunities will afford them ample cause to agree or disagree with my own clinical experience.

XLV.

ACUTE HEMORRHAGIC MASTOIDITIS.*

By Hanau W. Loeb, A. M., M. D.,

St. Louis.

It is rare indeed that an opportunity is afforded of discovering the presence of an acute hemorrhagic mastoiditis. This is only rendered possible by operating while its hemorrhagic nature is still manifest or by postmortem examination where death has supervened from an intercurrent disease or from an early and fatal complication.

According to the usual rule, an infection resulting in hemorrhagic inflammation of the mastoid cells should be of a virulent nature, and a serious result would be anticipated unless intervention is undertaken early in the disease.

The following case furnished an abundance of evidence in this direction: Miss Z. W., a pupil nurse at the Jewish Hospital, St. Louis, was taken on the evening of March 27, 1914, with severe pain in the left ear. She had previously never had any ear trouble whatever, and had never been subject to acute inflammatory troubles of the upper respiratory tract. She had had the usual diseases of childhood, however, without any aural complications.

On examination, the drum in the region of Shrapnell's membrane was slightly red, but not swollen or bulging. During the night, however, the membrana tympani ruptured, and by morning there was an abundance of serosanguinous discharge from the ear. The pain continued and pressure over the mastoid process was almost unbearable.

Meantime, her temperature ranged during the day from 99° at ten o'clock in the forenoon to 101° at nine o'clock in the evening. Pulse rate from ninety to one hundred and fifteen. During the night discharge was exceedingly copious, being still of the serosanguinous character, and the pain continued severe.

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*Read before the American Otological Association, May, 1915.

On the following day, March 29th, the temperature and pulse range were about the same; lower in the morning and higher in the afternoon. The pain continued severe and the discharge became more copious, but maintained its serosanguinous character. Blood count, 15,900, with seventy-eight per cent polynuclear neutrophiles, eleven and one-half per cent lymphocytes, nine and one-half per cent mononuclears and transitionals, one per cent polymorphonuclear eosinophiles. Smears from culture made from ear discharge showed Gram negative diplococci in short chains. Urine, specific gravity 1024, with a trace of albumin.

In view of the continuance of the pain and discharge, the sensitiveness of the mastoid process, the character of the organism, which by this time had been determined to be a diplostreptococcus of the type described by Davis, except for its Gram negative stain, and numerous fatalities in throat infections, also described by Davis, it was determined to exenterate the mastoid cells. This, too, in spite of the fact that less than four days had passed since the primary focus in the middle ear had manifested itself by pain.

After the customary preparation, a simple mastoid operation was made. The soft parts were not swollen and gave no evidence of any inflammatory or septic condition. When the periosteum was elevated the bare bone appeared almost blue in color, as if there had been marked necrosis present. Upon chiseling away the cortex, this was found due to the presence of a reddish blue clot filling every cell that was opened. In fact, it was possible to identify each cell by the color of the clot showing itself through the thin bone. No pus or granulation tissue was found in any of the cells, and the antrum was filled with a clot similar in character to that found in the other mastoid cells. The mastoid was entirely exenterated, the cavity in the bone packed with plain sterile gauze, and the skin incision closed by sutures, except at its lower portion, which was left open for the gauze drain.

Temperature six hours after the operation 102.5°. It continued close to this mark for eight hours, when it began gradually to recede. It rose again to 101° during the second evening after the operation, and to 101.5° on the fol-

lowing day, but after that, during the week following, it gradually approached the normal with slight elevation every evening.

On the day after the operation the blood count showed 31,900 white cells; three days later, 23,000; a week after the operation, 21,700. Blood culture, which was made on the day of the operation, proved to be negative. On the third day after the operation the urine was loaded with red cells, which, however, soon disappeared. The healing was rapid except for a small sinus which persisted for several months.

The bacteriologic report, made by Dr. F. L. Evans, is as follows:

"March 27th. Cultures show medium size opaque colonies, not mucoid and nonhemolytic. Smears from colonies show pure cultures of Gram negative diplococci, which have a tendency to form short chains. Organisms are not encapsulated, but have a slight halo surrounding them. Smears from discharge show diplococci only, no chain formation.

"March 30th. Mastoid operation. Culture from clots in superficial cells gave pure cultures of diplostreptococci. Smears show numerous red cells, pus cells and diplococci. From inner blod clots of the deeper cells both diplostreptotocci and staphylococci recovered. Hemolysis capsulation and mucoid character not present.

"April 1st. Diplostreptococci transferred to bouillon.

"April 2nd. Bouillon growth almost exclusively diplococci, a few short chains, however, being found. One-tenth cubic centimeter of bouillon culture injected into ear vein of a rabbit three months old.

"April 7th. Rabbit died during the day. Inflamed area around the site of injection, no sloughing. Culture made from heart's blood and site of injection. Intense hyperemia of all organs.

"April 8th. From heart's blood, Gram negative diplococci with a slight tendency to form chains were recovered. Cultures from site of injection negative.

"April 9th. One-tenth cubic centimeter of recovered diplococci (bouillon culture) injected into knee joint of rabbit.

"April 15th. Area of inoculation shows necrosis, no pus; cultures contaminated. Animal sick.

"April 18th. Rabbit died; cultures show staphylococci and hay bacilli."

It is fair, therefore, to assume that the acute hemorrhagic mastoiditis resulted from a middle ear infection due to the Gram negative diplococci in short chains, such as were found in the original discharge from the middle ear, in the clots from the mastoid cells and the antrum, and which were fatal when cultures of the organisms were injected into a rabbit.

There were in the hospital at the time quite a few cases of diplostreptococcal infection in various manifestations, such as lacunar tonsillitis, acute endocarditis, acute articular rheumatism and purpura hemorrhagica, which will be reported in a later paper.

There are three interesting questions brought up by this case:

1. The microorganism.
2. The hemorrhagic character of the inflammation.
3. The early date of operation.

1. The organism differed from that described by Davis and Rosenow[1] which was encapsulated and Gram positive, two factors which, according to Rosenow, may depend upon cultural conditions within and without the body. It differs materially from the streptococcus mucosus described by Neumann and Ruttin[2]; in fact, the clinical course of the case reported is entirely at variance with that of the type reported by these writers. Alberti[3], who made an extensive study of the bacteriology of acute mastoiditis, does not mention an organism possessing the characteristics of that which is here reported.

2. The hemorrhagic character of the inflammation, according to the general rule, would indicate a virulent type of infection. A fairly detailed study of the literature has failed to reveal instances in which other operators have found a similar picture. The condition present could not have been anticipated by any of the symptoms, unless the uncommonly long duration of the serosanguinous discharge might indicate a hemorrhagic exudate. It was exceedingly

interesting to observe each cell come into view as the clot appeared visible through the thin bony wall of the cell.

It is quite possible that more of these cases of hemorrhagic mastoiditis would be found if operative interference were called for so early in the course of the disease.

3. The justification for operating so early in a mastoid affection may be doubted. However, an infective agent, unquestionably of high virulency, symptoms rapidly increasing in severity, in spite of copious discharge, increasing leucocytosis and the compromising possibility of an acute meningitis, call for an operation in no uncertain tones. The postoperative fever and leucocytosis add weight to the evidence.

I have found it very difficult to get any definite information as to the frequency of early operations in mastoiditis following a first attack of acute suppurative otitis media. However, it is evidently exceedingly uncommon to operate as early as four days after the appearance of the initial symptoms. Several otologists have given instances to me of such early operations, but they have been, in the main, complications of scarlet fever, measles, or grip.

Texier and Levesque[4] describe three types of mastoid disease: subacute, acute, and hyperacute. In the last, tympanic and mastoid cavity are invaded at the same time by a very virulent microbe which may kill the patient by infection, intoxication or meningitis, before pus is formed in the mastoid cells. They have operated on some such cases. They claim operations should be performed two, three or four days after appearance of otitis, but they do not state how early they operated in any of their cases.

Taking the case as a whole, it demonstrates not only the occurrence of an acute hemorrhagic mastoid inflammation of bacterial origin, but also that a mastoid infection may be coincident with, as well as dependent upon, a middle ear inflammation.

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XLVI.

THE TONSIL OPERATION—AN INQUIRY INTO THE ACTUAL RESULTS OBTAINED IN A SERIES OF CASES.

By D. J. Gibb Wishart, B. A., M. D., C. M.,

Toronto.

Until an investigation such as this is well under way, the difficulties which the task presents are not appreciated; and if the number of cases brought into the limelight is not large, and the deductions drawn are liable to be criticised as based upon insufficient data. I can assure you that every effort has been put forth to accumulate the evidence. Hundreds of private patients have been written to, but owing to removals, changes of address in the lapse of years, the fact that many were nonresidents of Toronto, and finally the carelessness of parties addressed, the number of cases that finally submitted themselves for examination is but a small fraction of the number operated upon.

In the hospital clinic there were found to be some twenty-three hundred cases in all. My assistant, Dr. A. D. McKelvey, kindly undertook to get into contact with the cases operated upon in 1906-07, and four hundred and fifty letters were sent out, but the response was so meager that further expenditure of time and money seemed folly. The nonavailability of so much of the material upon which we as laborers in the free wards of our hospitals expend such a wealth of time and skill, when we desire to obtain data for important investigation, is startling, and calls for the inauguration of some definite method by which discharged patients may be required to come under observation at stated intervals.

In my own clinic we have for some years enucleated the tonsils of children. How are we to ascertain beyond the possibility of doubt whether this procedure is followed by evil

consequences, unless these cases can be observed and recorded until the age of twenty-five years be reached? Nothing short of this accurate following up of, not a proportion, but all cases, will enable us who are responsible for the methods of treatment pursued in large clinics to get upon firm ground. The personal predilections of this or that operator; the theoretic lucubrations of the scientist upon the economic value of the tonsil in the prepuberty years of life; the experience, however valuable, of the specialized specialist, to whose care fall a large proportion of the failures of the reliable operators, and the mangled botches of the abortionist, can never become reliable data upon which this question may be decided. It is not lack of material, but lack of carefully recorded observation. Could we not as an organization institute a royal commission to take evidence and report its findings? In this continent we undoubtedly vary greatly from our colleagues abroad in our treatment of the tonsil in the child. Our procedure is challenged, our position assailed. Perhaps we are wrong. Let us know beyond a peradventure.

In his article on the "Significance of the Tonsils," our confrère, Dr. D. R. Patterson of Cardiff, whom no one who knows him would ever accuse of being hasty in arriving at his conclusions, or ever unable to give an account of the faith which he holds, concludes with the remark: "They have an essential function in the body, and treatment designed to preserve them as a whole, or in part, so as to enable them again to fulfill it, is based on rational lines."

Can it be that the procedure to be adopted in dealing with diseased tonsils must vary according to the continent in which the lot of the patient is cast? Surely not. And yet the majority of the tonsils we are called upon to enucleate in the Toronto General Hospital, among adults, for recurring tonsillitis, quinsies, heart and joint affections, etc., are in patients who were subjected to the partial operation in Great Britain. It may well be that if Dr. Patterson could have followed his patients into after life, he would have modified the sentence which I have quoted.

I do not feel comfortable in permitting the enucleation of the tonsil in every child where operation appears to be called for, and yet I have not been able to glean anything from the

abundant literature provided upon the question which will show me the proper course to pursue.

In order to arrive at some data which would enable me to act with greater confidence, both with regard to my private clientele and in the instruction of my students, I set out upon the examination of cases which had been operated upon since I adopted the enucleation method, ten years ago, and requested the favor of these inspections solely upon the ground of desire for investigation into the scientific value of the procedure adopted. My secretary addressed letters to each patient on the history cards, just as they came, and without any omission, or selection of cases. All the cases which presented themselves have been tabulated without fear or favor, and therefore the record, so far as it goes, is of considerable value. The results have been noted under twelve heads, as follows: Occupation, sex, age at time of operation, years since operation, previous operations, if any, symptoms complained of, effect of operation upon these, anatomic conditions resulting from operation, effect of operation upon voice, effect of operation on general well being, symptoms unrelieved, and remarks.

I desired to obtain some information upon the result of the removal of the tonsils in diminishing or increasing liability to eruptive fevers, but the data obtained were quite unsatisfactory. It will be noted that I have not described the anatomic conditions present at the time of operation, nor stated what was actually done. These did not seem relevant to the inqury. In every instance complete removal of the tonsils, and of whatever else impeded the airway, was the operation performed.

The records compiled are from private patients, twenty-eight cases in all, of which five were obtained by correspondence, and twenty-three examined personally in my office. Those, seventeen in number, obtained from the hospital clinic by Dr. McKelvey, are set in a separate list, but owing to faulty histories, and the stupidity of parents, the records in this division are not complete, except as to present conditions. I will speak of them under three classes: Class 1, under twelve years; Class 2, between twelve and fifteen years; Class 3, eighteen to fifty-two years. The cases are numbered consec-

utively from 1 to 45. Those examined by myself, numbers 1 to 23; those obtained by letters, numbers 24 to 28; those obtained from the hospital clinic, numbers 29 to 45. Of these, Class 1 included numbers 1 to 10, 24, and 29 to 38, or twenty-one in all. Class 2 includes numbers 11 to 14, 25 to 27, and 39 to 41, or ten in all. Class 3 includes numbers 15 to 23, and 42 to 45, or fourteen in all. If Case 31 had not appeared in answer to inquiry, it would not have been incorporated in this report, as it has no bearing.

AGE AND SEX.

These cases range in age from three to fifty-two years. Up to fifteen years the cases are about equally divided between the sexes, but after puberty the proportion is two males to eleven females. Without an accurate computation of the numbers which have come to operation in each sex, this disproportion in the adult class is without significance.

TIME SINCE OPERATION.

The average time elapsed since operation in Classes 1 and 2 is seven years, and in Class 3, five years. In no instance has less than two years elapsed, and in seventeen cases, eight years or over. So far as Class 1 and Class 2 are concerned, further examinations should be made until the age of twenty-one years is reached, in order to make a final estimate of the actual results, but in Class 3, sufficient time has elapsed to render the conclusions fairly reliable.

EFFECT OF OPERATION UPON SYMPTOMS COMPLAINED OF.

The symptoms cover a wide area—tonsillitis, ten cases; frequent colds, fourteen cases; enlarged glands, three cases; voice defects, eleven cases; swelling and aching of throat, twelve cases; ear affections, ten cases; rheumatic symptoms, four cases; and headache, cough, enuresis, neuralgia, iritis, debility, restlessness, chorea, endocarditis, quinsy, dullness, etc., were complained of in one or more instances. In the private patients the operation was performed by myself, but in the hospital cases there is no record of the persons performing the operations, nor of the method followed.

For some years I have used the scissors to snip the plica,

and have freed the upper end of the tonsil by spreading its blades. The tonsil is then drawn into the ring and wire loop of the Beck-Mueller tonsillotome, and the tonsil removed intact.

It will be noted that in Class 1 all the cases were cured, except in Case 9, where, owing doubtless to the failure to remove some small section of the left tonsil, there was an enlargement of this, leading to involvement of the cervical glands seven years after. The same result was obtained in all the cases in Class 2, except that in Case 12 the operation was not early enough to prevent progression of the deafness, and in Case 26, where no information was obtained, the inference is that there was a failure. In Class 3 the results are equally satisfactory. In Case 23 the rheumatic symptoms are still sometimes present, but much less marked. Not only were the symptoms relieved, but it is notable that in nineteen cases the health was decidedly improved, and in no case was it deteriorated. The results of operation upon the symptoms actually present at the time when the consultation took place are so universally good that the operation itself is justified, and it is to be observed, regarding Class 1, that in the private cases when complete removal was effected, the results upon the symptoms are as good as, if not better than, in those among the hospital cases, where portions of the tonsil remain in situ. Nor is it apparent that the leaving of these portions of tonsils behind resulted in any benefit to the children whatever, nor did the removal of the whole tonsil damage in any way those children concerned.

ANATOMIC RESULTS.

In Class 1 (aged three to eleven years) the results are apparently perfect in seven cases, the position of the palate is normal in eleven cases, and in three cases there are minor variations, which may or may not be considered defects. In only one private case is there a real defect, the existence of a small patch of tonsil in the lower left sinus, and this must be held responsible for the existence of swollen glands in the seventh year after operation. In six of the clinical cases there are defects, chiefly the presence of small tags.

In Class 2 (aged twelve to fifteen years) in two cases (Cases 14 and 41) the results are apparently perfect. In Case

12 there is a marked variation in the curve of the palate arch. In Case 39 there is an obliteration of the pillars, and in the remaining three cases there are scars.

In Class 3 (aged twenty-one to fifty-two years) the results are apparently perfect in five cases. In three cases there are minor variations, which may or may not be considered defects. In four cases there are real defects. In the most seriously deformed of these (Case 21) the voice was definitely improved, and in Case 43 a good singing voice has been developed.

There is no doubt that in Classes 1 and 2 the anatomic results are better in those cases where the tonsil was extirpated in its entirety, and therefore there is a cosmetic benefit conferred by the complete operation.

In Class 2 the notes fail to show whether there were adventitious bands of adhesion, due to repeated attacks of inflammation of the tonsils, but the lesions of the pillars found present after operation may undoubtedly be ascribed to such a condition. It would be too great a charity to conclude that this excuse should cover those cases from the hospital clinic, as here the operators and operations may have been equal in number. Again, in Class 3, those cases who had suffered from repeated attacks of tonsillitis are those in which scars and malpositions are most numerous.

It will be remembered that in this city two years ago, Dr. Hudson Makuen of Philadelphia read his paper upon the "Surgery of the Faucial Tonsil as it Relates to the Functions of the Tongue and Soft Palate in the Production of the Voice," a paper which gave rise to much discussion, and in my own case to much searching of heart. Because of this I have carefully inquired into the effect of operation upon the voice in all these cases.

In Class 1 (aged one to eleven years) in only one (Case 24) is there a defect noted. In the one instance in which the present age is sufficient to demonstrate the possession of a singing voice, the young lady is something of a musician under the best of teachers, and is considered to have an excellent voice. In one there is no report. In the remainder the voice is to all appearances without defect.

In Class 2 (aged twelve to fifteen years) the three female

cases have each shown evidences of ability to sing, one (Case 12), the daughter of a colleague, has a most delightful voice, and promises to become an artist, and it is to be specially noted that here there is a marked variation in the height of the two sides of the palatal arch. In another (Case 12) there is fusion of the pillars of one side and a large scar, but the voice is all right.

Of the six males, five have good voices, and one is defective.

In Class 3 (aged eighteen to fifty-two years), of the eleven females, only one (Case 21) had a singing voice at the time of operation, and this was notably improved. Another (Case 18), who had lost her singing voice prior to operation, was neither better nor worse. Three (Cases 15, 16 and 19) lost the sense of fatigue in the use of the voice, two (Cases 42 and 43) had developed good voices, and all the rest were either unchanged or had improved.

Here again there is a deformity in the anterior pillars of the one whose singing voice notably improved, and also in Case 43, where the patient, a teacher, has a good singing voice. It may be urged that had the operation been perfect in its anatomic results in every case, the improvement in the singing voice might have been still better, but on the one hand there is proof that voices were improved by operation in spite of cicatrized deformities in the palate arch or pillars, and on the other it is to be noted that in the case (Case 18) where the anatomic result was perfect, the singing voice was not regained.

The effect of extracapsular enucleation upon the singing voice or fatigued voice is, therefore, not prejudicial, but may be considered beneficial.

EFFECT ON GENERAL WELLBEING.

No extended remarks are required in this connection, because it has been for years our experience that the removal of diseased tonsils is attended by marked improvement in the general health of the patient. Still, the testimony here, in practically every one of the cases here recorded, is singularly corroborative.

SYMPTOMS UNRELIEVED.

In fifteen cases these are mentioned; in three of these the nose is evidently the seat of the trouble; in five, the symptom complained of is aside from the question. In two, endocarditis is noted, once (Case 36) as a new symptom, and once (Case 29) as recurring in postoperative attack. The age of this case is worthy of note, and the beneficial effect of removal of the tonsils upon the disease is quite evident. In seven, the nervousness and choreic tendency is to my mind quite independent of the original throat condition.

REMARKS.

Under this heading I would draw your particular attention to Case 28. This lady had diseased tonsils and pyorrhea. It was a question which of these formed the focus for the marked rheumatic diathesis which was causing the patient great and increasing distress. The fact that the cure was brought about by the administration of a pyorrhea vaccine, emphasizes the importance of foci for pus formation being sought out. It is not that the tonsils should have been left alone, but that the vaccine should have been administered at the same time as the operation was performed.

Case 27 is also worthy of note, because operation upon the tonsils brought about the arrest and cure of a marked irregularity in the direction of the teeth, and emphasizes the influence of enlarged tonsils upon the formation of the dental curves, and the apposition of the teeth, a fact not yet sufficiently appreciated by the general practitioner.

Cases 22 and 23, in which frequent attacks of tonsillitis occurred in conjunction with acute inflammatory rheumatism, are of interest. In the first the result is a cure, and in the second there has been one slight attack of iritis, and in addition rheumatic pains in the throat and neuritis in one leg.

I have not thought it within the scope of this short article to refer to the observations of various operators upon the conditions which they have noted subsequent to operation, because as a rule their remarks refer to immediate and not to remote conditions, but it is pertinent to this inquiry to make two exceptions. The first bears out my own observa-

tion of the effect of scars, etc., upon the singing voice, and the second introduces a postoperative result which fortunately none of my cases exhibit. Dudley, in "Effect Upon Speech and Voice of the Removal of the Tonsils," mentions a case where a singer had tonsils removed, and although great irregularity of the palate arch was produced, there was improvement of the speaking voice, and no disturbance of the singing voice.

Stuckey, in "After-effects of Radical Tonsillectomy," mentions two cases where cicatricial contraction of the pillars caused discomfort in swallowing, and another in which tinnitus was produced by traction on the fossa of Rosenmüller.

As I stated at the commencement, this record contains too few cases to be conclusive in any direction, but should it be followed by similar reports from other operators who have inspected their own work, at some period sufficiently far removed from the date of operation, in the bulk the result will be illuminating, and point the road to sound practice.

Patient	Occupation	Sex	Age	Yrs. Sin. Op.	Prev. Oper.	Symptoms Complained of	Effect of Operation on Symptoms	Anatomic Conditions After Operation	Effect of Operation on Voice	Effect on General Health	Symptoms Unrelieved	Remarks
1	School.	F.	4	9		Frequent colds.	Cured.	Perfect.	Good.	Excellent.		
2		M.	5	5		Not stated.		Perfect.	Good.			
3	School.	F.	6	3		Earache, sore throat.	Cured.	Perfect.	Good.	In wonderful health since.		
4	School.	M.	6	9		Constant cough, nasal voice, enlarged cervical glands.	Cured.	Palate perfect. Anterior pillars are merged into wall. No puckering.	Good.	Very different since.		
5	School.	F.	9	3		Frequent colds, restlessness.	Cured.	Perfect.	Good.	Health better. Frequent sore throats.		

6	School.	F.	9	3	Earache and cervical glands.	Cured.	Perfect.	Good.	Health better.		
7	School.	F.	9	3	Earache, frequent colds, husky voice.	Cured.	Perfect.	Good.	Health indifferent.	Nervousness choreic.	
8	School.	M.	9	4	Constant cold in head, headaches, general debility.	Cured.	Palate O. K. Anterior pillars are merged into wall. No puckering.	Good.	Good.	Granular pharyngitis.	
9	School	F.	10	7	Earache, glands enlarged, throat swells and aches.	Earache and throat cured. Left glands swollen last winter. Cured.	Position perfect, small patch of tonsils in lower left sinus.	A very pretty singing voice.	A wonderful difference. Grew eighteen inches in fourteen months.		
10	School	M.	9	10	Disturbed sleep, deafness, running ears, enuresis, swollen throat, nasal voice.	Cured.	Sinus shallow.	Sings in a choir. No difficulty.	Health very good.		

Patient	Occupation	Sex	Age	Yrs. Sin. Op.	Prev. Oper.	Symptoms Complained of	Effect of Operation on Symptoms	Anatomic Conditions After Operation	Effect of Operation on Voice	Effect on General Health	Symptoms Unrelieved	Remarks
11	School.	M.	12	5		Frequent soreness and swelling of throat.	Cured.	Small remains of tonsil in upper right. Slight puckering scar in upper left.	Good.	Much improved health.		
12	School.	F.	12	7		Nasal voice, tonsils swell frequently, crypts fill up. Slight deafness.	Subsequently treated for deafness.	No scars or puckering. Left posterior pillars perfect, but only seen with mirror. Marked variation in curve of palate.	Has developed a magnificent voice, powerful.	Excellent health.	Deafness.	Mother is very deaf.
13	School.	F.	14	8		Colds in head, headaches. Sore throat. Urates abundant.	Cured.	Right pillars are fused above, and a large scar below. Left perfect.	Sings a lot with ease and comfort, but not strong voice. Has two and one-half octaves, four notes higher than usual.	Health fair.	Indigestion, rheumatic pains on damp days. Colds on chest. Turbinals edematous.	

14	School.	F.	14	3	Frequent tonsillitis. Throat swells, hoarseness, nasal voice.	Cured.	Perfect.	Sings. Voice improved one hundred per cent.	Never well previously, now greatly improved in every way.		
15	Librarian.	F.	21	2	Frequent sore throat.	Cured.	Left tonsil sinus shallow.	Voice less fatigued after use.	Health improved since.		
16	School teacher.	F.	24	5	Fatigue and fullness in throat, especially in damp weather. Tonsillitis off and on. Voice affected.	Quite relieved.	Perfect.	Still teacher. Voice equal to all necessities. Teaches singing.	Health excellent. Greatly improved.		
17	Maid.	F.	25	6	1 One cold on top of another. Ears run at times.	Cured.	Uvula absent, otherwise perfect.	Clearer.	Health improved.	No rheumatism.	
18	Stenographer.	F.	28	8	Recurrent pains in throat. Throat fatigues easily. Is obliged to give up singing. Poor health.	Results satisfactory. Would have it done again in view of result.	Perfect.	Voice neither worse nor better. Has not taken up singing since.	Good.	Uric acid.	Slight attacks of pain in throat since.

Patient	Occupation	Sex	Age	Yrs. Sin. Op.	Prev. Oper.	Symptoms Complained of	Effect of Operation on Symptoms	Anatomic Conditions After Operation	Effect of Operation on Voice	Effect on General Health	Symptoms Unrelieved	Remarks
19	Stenographer.	F.	29	4	1	Tonsillitis; throat aches after reading aloud.	Cured.	Palate arch perfect. Right pillar concealed. Sinus is shallow on left.	No fatigue even in using.	No change.		
20	Housewife.	F.	35	4		Repeated bad colds and sore throat.	Cured.	Perfect.	Excellent.	No change.	Bronchitis.	
21	Sings a great deal. Is a choir leader.	F.	34	9		Five attacks of tonsillitis this winter. Neuralgia.	Cured.	Anterior pillars notched and deformed.	Sings with greater ease, and possibly better quality.	Became a different person, and lost her "nerves."	Some neuralgia (much less).	
22	Business.	M.	36	4		Tonsillitis every winter for five years, severely. Just recovering from an attack of acute rheumatism.	Not an attack since.	Puckered cicatrix at bottom of each tonsil sinus, which are both deep.	Good.	Greatly improved in general health.		

23	Housekeeper.	F.	41	8		Tonsillitis very frequent and severe. Four attacks of iritis. Acute inflammatory rheumatism once. Chronic rheumatism.	None since. Once slightly.	Pillars on right fused, with scar.	Good.	Decidedly better. Neuritis in one leg. Slight sore throat.		If needful to ge the benefit ob tained, would re peat operation.
24	Nursery.	M.	3	4	1	Snuffling, snoring, etc. Tonsillitis.	Some aching off and on. Cured.	Not seen.	Huskiness.	Much improved in health.	Mouth breathing.	
25	School.	F.	11	4		Semiidiotic appearance. Mouth breather.	"The child was a lot better in every way."	Not seen.				
26	School.	M.	14	9		Catches cold easily, nasal voice, tonsillitis.		Not seen.	Voice muffled.		Attacks of sore throat.	

Patient	Occupation	Sex	Age	Yrs. Sin. Op.	Prev. Oper.	Symptoms Complained of	Effect of Operation on Symptoms	Anatomic Conditions After Operation	Effect of Operation on Voice	Effect on General Health	Symptoms Unrelieved	Remarks
27	School.	M.	15	8		Frequent colds in head, tonsillitis.	Both cured.	Not seen.	Clear, with plenty of volume.	Markedly and permanently beneficial.		Teeth, which ha showed marke irregularity, cam into line withou any resort t pressure. Subse quent operatio for adenoids re quired.
28	Housewife.	F.	52	2		Diseased tonsils, supposed a focus for rheumatic diathesis.		Not seen.	Unaltered.	No effect. The throat has given some trouble since operation.	Patient unrelieved until six months later. A vaccine prepared from gums of patient suffering from pyorrhea was administered.	

29	Infant.	F.	3	6	Chorea, endocarditis.	Improved.			Improved.	Endocarditis once since.	
30		M.	5	8	Difficulty in breathing.	Good.	Adhesion right tag posterior pillar, scar on palate.	Good.	Good.		
31		F.	5	8	Obstruction, adenoid only.	Good.	Tonsils present.	O. K.	O. K.		
32	School.	F.	6	8	School sent her.	Good.	Shortening of palate and left posterior pillar.	Good.	O. K.		
33	School.	M.	7	7	Dull. Mouth breather.	Good.	Remains of tonsil, inferior fossæ.		Good.		
34	School.	M.	8	8				Lost uvula.	O. K.	Colds in head.	
35	School.	M.	9	7	Nocturnal mouth breather.	Good.	Double tag and inferior fossæ.	Improved.	Good.		

Patient	Occupation	Sex	Age	Yrs. Since	Prev. Oper.	Symptoms Complained of	Effect of Operation on Symptoms	Anatomic Conditions After Operation	Effect of Operation on Voice	Effect on General Health	Symptoms Unrelieved	Remarks
36	School.	M.	9	8		Mouth breather.	Good.	Perfect.		Improved.	Endocarditis.	Turbinate hypertrophied.
37	School.	M.	10	7			Good.	Left clean, with slight puckering right tag.		O. K.		
38	School.	F.	11	7		Dull. Mouth breather.	Good.	Remains of tonsil. Inferior base of both.		Good.		
39	School.	M.	12	7	*1	Frequent colds.	Better.	Excellent. Obliteration of pillars.	Good.	Good.		
40	School.	M.	12	8	†1	Sore throat. Obstruction.	Good.	Adhesion on left side at scar of pillars.	O. K.	O. K.		

41	School.	M.	12	8		Dullness. Obstruction.	Good.	Good.	O. K.	O. K.		
42	Student.	F.	18	4	*1	Nocturnal mouth breather. Frequent coryza.	Excellent.	Perfect.	Advanced pupil in singing. Voice improved.	O. K.		
43	Teacher.	M.	19	4		Frequent quinsy.	Excellent.	Scarring of left anterior pillar and small tag.	Good singing voice.	Good.	Occasional cold in the head.	Deflected septum
44	School.	F.	19	7		Intermittent mouth breather.	Good.	Improved.	Improved.	Improved.	Sore throat.	
45	Shipper.	M.	23	8		Frequent colds. Tonsillitis. Difficulty in breathing.	Continues good.	Small tag in right tonsillar pillar.	Good.	Good.	Colds in head.	Deviated septum

*Adenoid. †Partially removed in England.

XLVII.

REPORT OF A CASE OF TRAUMATIC MASTOIDITIS.*

By C. Johnstone Imperatori, M. D.,

New York.

V. F., six months old, of Bohemian parents, presents the following history:

His family and previous history is negative as regards its bearing on the case and is, therefore, omitted. He has been breast fed and has always been in good health up to the present time.

On the morning of February 9, 1915, he fell from a table a distance of three feet, striking his head behind the ear—on the left side. He did not become unconscious, nor did he vomit following the fall. There was no blood from the ear, nose or mouth, and while he remained awake part of the afternoon, his mother said he did not cry until evening. He seemed to be slightly dazed. During the night he nursed as usual, and continued to do so regularly for two days following the injury.

He was seen by a physician immediately following the fall, but nothing was noted until the third day after the accident, when a swelling developed behind the left ear. At this time he had fever and refused his feedings. This condition continued, the enlargement behind the ear increasing in size, until the time of entrance to the Babies' Ward of the Red Cross Hospital, six days following the injury.

The physical examination of the child, made at this time by the attending pediatrician, Dr. Pisek, showed a well nourished child, with a postauricular swelling on the left side. Otherwise everything else was normal. On examination of

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the left ear a bulging drum was seen. It appeared a deep purple in color. The drum was incised and considerable dark blood and some stringy mucopurulent material came out. A smear on examination microscopically showed pneumococci.

A diagnosis of mastoiditis with a subperiosteal abscess was made, and the child was operated upon that afternoon with the following operative findings:

A simple mastoid operation was done. On exposing the cortex of the temporal bone in the region of the antrum, a line of fracture was seen running posteriorly in a horizontal direction to a necrotic spot, which was just in front of the squamomastoid suture. The line of fracture took a general direction, as that of the German base line, and was about two centimeters in length. The necrotic spot was about one-half centimeter in diameter. The mastoid cavity was filled with detritus, and there was considerable pus in and about the antrum. Some of the cells contained dark brown material. The fracture did not extend through the inner plate. Examination of the necrotic spot, after removal of the rest of the cortex, showed granulations on the dura, which was exposed a little more than one-half centimeter. The exact situation of this area was at the upper posterior superior angle of the mastoid cavity. The mastoid cavity was of a normal infantile type, with the sinus and middle cranial fossa in the normal location.

POSTOPERATIVE HISTORY.

General condition seemed good, nursed fairly well, stools were normal and there was no vomiting. Temperature fluctuated between 100° and 101° for the first three days after the operation. Then there was a period of four days with the temperature ranging between 100° and 103°. This was followed by another three days of decline of the highest point in the twenty-four hours and resembling the first three-day period. On the tenth day after the operation the temperature reached normal. It remained normal for about a day and then a characteristic septic type of temperature ensued, the range being from subnormal to 105° within the twenty-four hours. The pulse varied from 120 to 150, with respirations between 28 and 40.

A blood culture taken on the eighteenth day following the

injury, and the first day of the high temperature, was negative. A second blood culture, taken four days later, was also negative. Leucocytosis averaged about 17,000 total and sixty per cent polynuclears. During the stay in the hospital there was a gradual loss in weight of one pound and five ounces. On admission the child weighed sixteen pounds and ten ounces. Von Pirquet reaction and the urine were negative.

On March 6th, nineteen days after the original operation and twenty-five days after the injury, taking the temperature as a guide, it was decided to do an exploratory operation on the sinus and if necessary resect the jugular.

The operative findings were as follows: On exposing the cortex, well back posteriorly and below the sinus in the region of the posterior lateral fontanelle, there was an area of bone destruction over one centimeter in diameter, mainly involving the occipital bone. The dura had no granulations on it, but it appeared a paler blue than the surrounding dura. It was thought that very likely here was a point of entrance of the infection and it was decided to explore the underlying brain. Two incisions were made in the dura and the underlying cerebellum explored with negative results. The bone covering the whole length of the sinus in the mastoid cavity was found to be necrotic and the sinus was uncovered down to the bulb. The sinus wall was found bathed in pus. The wall appeared pale in contrast to the surrounding dura. The wall was incised just below the knee, the incision being about two centimeters in length. There was free bleeding from the torcular and bulbar ends. The inner wall of the sinus was everted and closely examined for a mural clot or phlebitis, but the characteristic smooth and glistening appearance of a normal sinus presented.

There was very little change following the operation; the child died sixty hours later. Unfortunately autopsy was refused.

Regarding the diagnosis, it would seem that this case can be considered as one of traumatic origin, complicated possibly by a jugular bulb thrombosis.

It would seem from the temperature that this was a case of venous poisoning, and that this was the cause of death. Although there was a rather persistent cough, repeated examinations of the chest and X-ray were negative. Two X-rays

of the skull, taken for other lines of fracture and done by different men, were negative.

Two days before death there was a slight Kernig, but no cervical opisthotonos or Babinski. Lumbar puncture was negative. Regarding the two negative blood cultures, it is possible that the small amount of blood obtained was the reason for not getting positive results.

XLVIII.

FACIAL CONTRACTIONS DURING THE RADICAL MASTOID OPERATION.*

By Charles E. Perkins, M. D.,

New York City.

We are all interested in facial twitching during the radical mastoid operation, and any experience which throws light on that subject should be of interest. It is for that reason that I desire to present this subject for your consideration.

It is a well known fact that mechanical irritation of the facial nerve results in facial contractions. These are reported to the operator by the anesthetist and form a very valuable source of information. A thorough knowledge of their significance becomes of great importance to the otologist.

1. If the nerve is completely severed there will be one, and only one, contraction, which will involve all of the muscles supplied by the facial. The anesthetist will be able to see that both the muscles at the angle of the mouth and those around the eye are involved. The patient will, of course, have complete facial paralysis from that moment, and it is very liable to be permanent. One cannot deny the possibility of healing taking place between the divided ends of the nerve, especially if they are cleanly cut, as with a sharp chisel, and there is no retraction or bone jammed between them. There is, however, so little probability of the conditions existing that favor a reunion of the nerve filaments, that should partial resumption of the function of the nerve occur, we would be more apt to assume that the original injury had resulted in partial division rather than that the nerve had been totally severed and that reunion had taken place. One can conceive that it is possible to have more than one facial contraction with total division of the nerve, the twitching being caused by

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mechanical irritation of the distal end of the nerve, but there is very little probability of this happening. The only way to prevent this first form of facial twitching from occurring is, of course, avoidance of injury to the nerve through a good technic, a thorough knowledge of the anatomy of the bone with its variations, and a dry field.

2. In a second type of case the nerve is injured by the instruments of the surgeon, but not completely severed. This takes place more readily if the nerve is bare, but the tympanic wall of the fallopian canal is such a thin shell of bone that it is easily removed with the curette. There will be one or more twitches, as the case may be, but one should be enough to warn the surgeon. The patient usually emerges from the anesthetic with partial facial paralysis which rapidly becomes complete through inflammation of the remaining part of the nerve. This partially clears up in time. The improvement usually begins after six weeks, but may be much longer deferred, as in the following case, which was under the care of one of my colleagues, and as well as the other cases reported on the service of Dr. Dench at the New York Eye and Ear Infirmary:

S. B., male, thirty-two years old. Chronic discharge from the ear for five years. Had ossiculectomy without improvement. Radical mastoid July 29, 1910; no twitching. Cavity dermatized except in the tympanum, especially in the region of the oval and round windows. Here there were granulations from which discharge persisted until ten months later, when it was determined to remove these and insert a Thiersch graft. While this was being done with the curette there was one well marked facial contraction elicited when the curette was in the region of the oval window. Patient emerged from ether with nearly complete facial paralysis, rapidly becoming complete. The cavity entirely healed, but the paralysis persisted for two years, when it began to clear up. The improvement continued until the two sides of the face are nearly alike. He can close his eye quite well, the movements around the mouth are not quite as free as on the opposite side, and he is unable to produce the lines on the forehead. It is difficult to account for this improvement, which is surely extraordinary, without assuming the occurrence of some regeneration of the nerve fibers.

3. A third type is where the nerve is bare. This is generally in the horizontal part of its course, either as a developmental anomaly or the bone over the nerve has been destroyed by necrosis or erosion from cholesteatoma. If the bare nerve is touched with a probe it usually produces a facial contraction. The pressure of the gauze sponge as it is packed into the middle ear after the bridge has been taken down may lead to the same result. The operator is fortunate when this happens, as he is then forewarned and able to avoid injury to the nerve. Illustrating this type is the following case:

A girl of sixteen years had aural discharge for years; the odor was foul and the membrana tympani destroyed. A radical operation was performed and cholesteatomous masses were found. After I had taken down the bridge the first time the assistant packed the gauze sponge into the cavity there was a well marked twitch. This was repeated throughout the operation every time the gauze was packed against that part of the internal tympanic wall where the fallopian canal is situated. In cleaning up the cavity great care not to injure the nerve was taken. The cavity was packed with gauze most too firmly. Light packing in these cases is advisable. Patient emerged from ether free from paralysis. In twelve hours weakness of facial muscles was noticed, and in forty-eight hours paralysis was complete. It lasted six weeks, then cleared up perfectly. During the healing process the patient developed interstitial keratitis, and then we noticed she had Hutchinson teeth. She, however, made a good recovery, but on account of my temerity in dealing with tympanic granulations the cavity is not all that could be desired. She remains now, after four years, free from further paralysis with a dry cavity.

4. A fourth type where twitching is caused by traction on the chorda tympani is illustrated by the following case:

J. B., male, had discharge from right ear for thirteen years. Membrana tensa was destroyed and internal tympanic wall dermatized. Discharge came from antrum through sinus beneath Shrapnell's membrane; malleus present. Radical operation January 15, 1915. After the antrum was opened the first time the gauze was packed into the cavity a well marked twitch occurred. This took place as often as this procedure was repeated until the bridge was taken down, when gauze

could be packed into the antrum without twitching. The removal of the bridge released a mass of granulation tissue and débris which fell into the lower part of the tympanic cavity, any interference with which, either by curette or gauze sponge, resulted in facial contractions. Where this mass was finally removed, a white filament was found attached posteriorly. The patient was allowed to partially emerge from ether, when seventh nerve was found to be intact, as shown by movements of the face. This filament was therefore the chorda tympani, although much larger than the normal nerve. No dehiscence in the fallopian canal could be found. The patient recovered without facial paralysis. During the healing process every time the applicator was inserted in the region of the promontory he complained of a severe shock in his tongue. This shock did not appear to be of gustatory nature, and was due, no doubt, to irritation of the central end of the chorda. The twitchings in the early part of the operation are to be explained by assuming traction on the nerve. There was a cholesteatomatous mass in the aditus and tympanic vault. When the gauze was packed into the antrum, pressure upon this resulted and caused bulging of Shrapnell's membrane, perhaps also displacement of the ossicles with consequent traction on the nerve. When the nerve was severed anteriorly, as it was when the bridge was taken down, traction produced in this manner became impossible and twitching upon sponging in the antrum ceased.

When we come to consider the fact that we have to deal with the chorda tympani in every radical operation, it seems singular that we have so few cases in which its disturbance is accompanied by facial contractions. While in a number of my operations there has been a slight twitch which I have been inclined to attribute to disturbance of the chorda, the above case has been the first one in which evidence of this sequence has been conclusive. It seems, therefore, that some unusual change in the nerve itself is necessary, and also perhaps some anatomic peculiarity of the osseous canals, before this can take place. The chorda is involved in the chronic suppurating ears in fully fifty per cent of cases, as will readily be seen by tests of the taste.

If there is a neuritis with absorption of nerve elements and formation of new connective tissue, we can readily see that

this might lead in some cases to the formation of a comparatively strong nerve—one capable of sustaining sufficient traction to cause mechanical irritation of the facial, presuming the anatomic conditions to be such as would be favorable for the transmission of this force. We may assume that in some cases at least this change in the nerve would extend to its facial origin.

Now, if for any reason the iter chordæ posterius should be of larger caliber than usual, and at the same time shorter as a developmental anomaly, the conditions would be ideal to allow force exerted upon the tympanic chorda to be transmitted to the facial. I am satisfied from examination of dry bones and dissections that these variations do occur; moreover, an inflammation of the nerve might lead first to swelling with enlargement of the iter, and from subsequent connective tissue changes to a diminution in its size, thus resulting in a small tough nerve lying comparatively free in its canal.

Finally, it is possible that some peculiarity of the facial connection itself might exist that would conduce to transmission of mechanic irritation through the chorda, as, for instance, a lateral connection producing rotation of the facial upon chordal traction. All of these conditions would, of course, but seldom be present, or even enough of them to allow the phenomenon under discussion to occur; hence, facial contractions during the radical operation arising from force exerted upon the chorda tympani are comparatively rare.

In conclusion, would say that it is not claimed that facial paralysis occurs only in those cases which have presented a facial contraction. In a small number of cases either the contraction has occurred and has not been noticed by the anesthetist, or it is possible that it has not taken place. Personal experience and observation, however, lead me to believe that injury to the nerve manifests itself first as a facial contraction, and if the anesthetist is on the lookout he will see and report it. This certainly will be an aid to the surgeon, but should not be relied upon by him to the extent of making him feel one particle less responsible for the effect of every move made in the region of the facial nerve.

XLIX.

THE DIFFERENTIAL DIAGNOSIS OF LARYNGEAL MOTOR PARALYSIS.*

By Otto J. Stein, M. D.,

Chicago.

In all disturbances of motor stability of the larynx, one must remember that there may be present an individual state of either spasm, paresis or paralysis, and that there may also be a concomitant state of two or all of these manifestations. As a paresis is but an incomplete state of paralysis, they necessarily are often associated and therefore considered together.

In classifying paralyses, account must be taken of the variety, causes, anatomic relationship and associated symptoms.

All motor paralyses of the laryngeal muscles originate from causes located centrally or peripherally, the latter constituting by far the greater number. Those of central origin may have their cause situated in the cortex or in the motor tract, like the internal capsule, pyramidal lobes, pons or medulla. The most frequent central causes are tumors, bulbar paralysis, multiple sclerosis, amyotrophic lateral sclerosis, general paresis, syringomyelia, apoplexy, softening and syphilis, which includes tabes. The latter disease is the most important of all causes within the medulla. The two laryngeal symptoms in tabes are crises and paralysis. The crises are occasioned by a prickling and tickling sensation in the larynx, causing coughing and often suffocating attacks with crowing inspiratory tones and, at times, loss of consciousness. The voice may be husky or aphonic. These symptoms are due to sensory disturbances of the larynx, incoordination of the laryngeal muscles and spasm of the glottis. Laryngeal motor paralysis of the larynx due to tabes may exist without any history of a crisis. It may be the only recognizable symptom of the

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disease for a long time, and is often a very early symptom. But when associated with such other well known symptoms of tabes as contracted pupils, reacting only to accommodation, areas of skin anesthesia, reduced or absent patellar reflex, difficult coordination, especially with closed eyes, lightning-like pains about the waist or down the legs and anuria, the diagnosis is assured.

In syringomyelia there is both motor and sensory disturbances of the larynx, but there also is associated involvement of the pharynx, soft palate and tongue. Laryngeal crises like in tabes have not been recognized in this disease. In a general way where there is an association of a tachycardia and a paralysis of one or more cranial nerves, in addition to the bilateral laryngeal paralysis, it is highly significant of a central disease. In hysteric aphonia we have the psychic type of paralysis, the center for which is the cortex. The sudden onset and recovery, the hesitating way the cords attempt to approach one another in attempted speech, the phonic cough and laugh and also voice when asleep and dreaming aloud, make the diagnosis clear.

As already mentioned, the paralyses of peripheral origin constitute the greater number of cases recognized. The paralysis is due to some interruption in the transmission or reception of the motor impulse and is caused by contiguous pressure, inflammation or degeneration of the nerve elements. The pressure may be occasioned by a tumor, gland, aneurism, adhesions, foreign body, etc. The inflammatory and degenerative cases may be due to trauma, disease, drugs, etc. In all cases, other than those due to a mashing or complete severence of the recurrent nerve, the paralysis of the muscles follows in a certain order, namely: The abductors are affected first (the cricoarytenoidei postici), the internal tensors (the thyroarytenoidei interni), and finally the adductors (the cricoarytenoidei laterales), which Semon attributes to a selective biologic change within the nerve fibers. Notable in peripheral paralysis is the atrophy of the muscles. Where atrophy of the paralyzed abductor muscles can be demonstrated, and especially if attended by a paralysis of the internal tensors, there is sufficient evidence that a paralysis and not a spasm is present.

In spasm of the glottis the attacks of difficult breathing are

at times severe and may go to cyanosis and unconsciousness, but ordinarily they are of short duration. The attacks are recurring in type, especially under certain circumstances like an emotional state, etc. In some cases there is an accompanying spasm of neighboring muscles, like those of the pharynx, palate and esophagus. Sometimes the hyperkinesia alternates with a hypokinesia as well as a parakinesia, so that where there exists violent dyspnea with a peculiar shrill cry, there follows aphonia and normal breathing or any combination of these conditions. Hence the variability in these symptoms is significant of spasm. It must be remembered that voice may be absent even though the cords approximate. This may be due to a cortical irritation, but it is usually a purely functional disorder. Such is the mogiphonia of Frankel or the dysphonia spastica of Schnitzler, and they are disorders of occupation, for under normal conditions the voice is all right, but, like in writer's cramp, for instance, the excessive use of the voice under trying circumstances will result in aphonia. A good way to determine a spasm is to have the patient take a note, while under mirror observation, and sustain it as long as the examiner does, which is to the end of the breath, and it will be noted that a deep involuntary inspiration is taken with separation of the cords, thus showing the central reflex action on the abductors.

In some cases of ataxia (tabes) or following diphtheria, and even in peripheral pneumogastric involvement, there may be present a spasm and a paralysis at the same time, a contraction on one side and a relaxation on the other side.

Sometimes an ankylosis of the cricoarytenoid articulation may so immobilize the cord as to simulate a paralysis, and in particular one should be alert to the presence of an infiltration such as results in malignancy. Cicatrices may also bind the joint or the cord in a way to obliterate the voice or interfere with free breathing.

In case of myasthenia or other general diseases like severe anemia, great exhaustion, or loss of blood, there may be a very weak action of the cords amounting to a paresis. Whenever the internal tensors and arytenoid muscles alone are involved the cause, most likely, is purely local.

It is of noteworthy importance to remember that there may be complete absence of all throat symptoms even though a

paralysis be present. Paralysis due to an enlarged or diseased thyroid gland, an aneurism and the like is frequently overlooked and not recognized, simply because the larynx is not systematically examined. If the larynx of every patient were carefully examined with a mirror many paralyses would be found that otherwise pass observation.

This information is of particular importance to every surgeon before operating upon a goiter, for if a paralysis due to pressure of the gland is not discovered until after the operation, it may be assumed that the nerve was injured at the operation. The laryngologist may render invaluable service by diagnosticating a paralysis of the cords due to tabes, goiter and aneurism, even when no other noticeable symptoms of the disorder exist.

In paralysis of the tensor muscles one can see, besides the concave or wavy outline of the cord's edge, a depressed appearance on inspiration and an elevated appearance on phonation, this being due to the action of the air current on the relaxed cord. In this connection I will refer to a case, recently presented by Samuel Iglauer before a meeting of the American Laryngological, Rhinological and Otological Society held at Cincinnati, in which the cords approximated during inspiration and separated on expiration. Dr. Iglauer explains this anomalous action of the cords as due to the inspiratory current of air drawing the cords together and the expiratory current separating them. Others have accounted for the condition due to a perverted nerve action—that is to say, the stimulus for the abductors is transferred to the adductors. Frankel was the first to describe this condition, and Moritz Schmidt devotes considerable space to a description of various vicarious actions of the cords. The patient that Dr. Iglauer presented was wearing a tracheotomy tube for a bilateral abductor paralysis, and if examined by means of a Hays pharyngoscope, with closed mouth and nostrils, the vicarious action of the cords was said to disappear.

L.

A CASE OF ACUTE MENINGITIS ASSOCIATED WITH ACUTE SUPPURATIVE OTITIS MEDIA, BOTH PRODUCED BY STREPTOCOCCUS MUCOSUS CAPSULATUS.*

By Robert L. Loughran, M. D.,

New York City.

Ralph Hausrath, age ten years, was admitted to the Manhattan Eye, Ear and Throat Hospital on the evening of December 24, 1914. On December 21st he came home from school at noon, complaining of pain in the right ear and discomfort in his stomach. He was given a dose of castor oil, and on the following day was feeling very much better. He slept all of the next night, and on December 24th he left boarding school in the early morning for his Christmas vacation, feeling bright and cheerful. Those in charge of him at the school state that the gastric disturbance had cleared up, and that he did not complain of his ear. To quote from their letter: "When he left here we felt perfectly contented and at ease, only we were so sorry he looked so 'drawn.' Of course, we attribted that to his stomach, as he said his ear was better." And again: "The morning he left here he was bright, ate heartily, and was talking and relating stories. He was in his usual cheerful and talkative mood, only he looked rather drawn. He did not complain of his ear. He said he did not have an earache. It merely went 'tic-a-tic.' It was relieved by a hot water bottle. We cannot understand why, if he had an abscess, it came on so quickly. He had no fever except about half an hour before the castor oil operated."

Upon his arrival in New York that afternoon he complained of a general headache and discomfort in his ear, which he described as a feeling like his heart after he had been run-

*Read before the New York Academy of Medicine, Section on Otology, March 12, 1915.

ning. He was seen by his family physician and referred to the hospital. When seen in the evening he presented a drum membrane indicating the beginning of an acute exudative otitis media, congested and bulging, but not excessively so. The mastoid was negative. The drum was incised and a small amount of serosanguinous fluid evacuated. Temperature, 103°; pulse, 112; respirations, 24. During the next day his temperature dropped to 101°, and rose to 103° in the evening. The ear was comfortable and the discharge serosanguinous and slight in amount. He complained of pronounced general headache. This was relieved to a certain extent by bromids. His neck was slightly rigid, but this was explained by his saying that it made his headache worse to move his head. On the 26th the temperature rose to 105° in the evening, and the discharge became purulent and profuse. There were no earache and no mastoid tenderness. Headache persisted. On the 27th his morning temperature was 103°; at noon, 104.6°; pulse, 117; respirations, 24. When seen by me at noon he presented an entirely new picture. His neck was rigid and retracted—this having come on during the morning. Further examination elicited the fact that he had a pronounced Babinski and Kernig symptoms. Physically there was no change; he still complained of his headache. There was no change in the ear condition, except that upon deep pressure over the antrum the boy said it felt a little sore. A blood count taken during the morning showed a leucocytosis of 22,000, with a polynuclear percentage of ninety-one. A lumbar puncture was immediately done, and a turbid fluid under moderate pressure withdrawn. This was immediately reported upon, and showed in "direct smear the streptococcus mucosus capsulatus in large numbers. Lactic acid present; sugar negative." This report from the laboratory was accompanied by another which should have been sent down the day previously—the advent of Christmas day having interfered with the regular schedule. It showed that a culture of the fluid evacuated at the time the drum was incised contained the streptococcus capsulatus.

Feeling that the otitis must have been the primary focus of the meningitis, an immediate mastoid operation was performed, which demonstrated the fact that the infection had not advanced through the mastoid cells. The mastoid was

negative except for a small amount of serosanguinous fluid in the antrum and some congestion of the surrounding cells. The tegmen antri was removed and the dura found to be normal at that point. The tegmen tympani was removed as far forward as possible and the dura found to be in the same normal condition.

There were no acute mastoiditis and no inflammatory condition of the dura in relation to the mastoid or middle ear as far as could be seen. Following the operation the patient went through the regular course of acute meningitis, with no spinal symptoms. He was perfectly conscious for three days and then passed into a gradually increasing delirium, and died on the fifth day. His temperature ranged around 104°, with two drops, one to 100.4° and another to 100°. An autopsy was not obtainable.

This case is reported as one primarily of acute meningitis in which the symptoms of acute otitis were the first to present themselves. It would have been reasonable to suppose that the meningitis following later was but an infection of meninges through the mastoid. The operation disproved this. We had, therefore, to deal with an acute meningitis followed by an acute otitis, both produced by the streptococcus capsulatus, and both independent of each other.

And the case is of especial value as a demonstration of the necessity of always keeping well in mind the infection producing an otitis media, and the seriousness of the possible complications when the mucosus capsulatus coccus is the agent at work.

LI.

A CASE OF ACUTE EXACERBATION OF A CHRONIC MASTOIDITIS WITH CHOLESTEATOMA, EXTENSIVE EPIDURAL ABSCESS, PURULENT PACHYMENINGITIS, WITH EXPLORATORY INCISION OF THE DURA AND LATERAL SINUS—RECOVERY.*

By Robert L. Loughran, M. D.,

New York City.

Arthur Ferguson, age twenty-five years. Admitted to the Manhattan Hospital on August 6, 1914. Two days previously he had presented himself to the clinic, complaining of an excruciating pain in the right ear of one week's duration. He explained that he wanted the ear "cut" and the pain would be relieved. The condition had occurred several times before, and an incision of the drum had relieved it. Otoscopic examination showed an exacerbation of a chronic purulent otitis media, and furthermore demonstrated the fact that the drum was absent, and the ear was filled with dense scar tissue. This was edematous and deeply congested. There was no pus following the incision, but bleeding was profuse. On the following day he came into the hospital, the pain not having been relieved. Following admission he had a chill, and the pain seemed referred more to the whole side of the head rather than to the ear. There was no aural discharge. He was partially delirious; temperature, 104.4°; pulse, 120; respirations, 24. During the night he had another chill, lasting seven minutes, and his temperature rose to 106°, which dropped in six hours to 102°. Just before being sent to the operating room the blood count showed a leucocytosis of 16,000 and a polynuclear percentage of eighty-five.

A radical mastoid operation was performed, and a well

*Read before the New York Academy of Medicine, Section on Otology, March 12, 1915.

organized cholesteatoma found filling the antrum and middle ear cavity. There was considerable excavation of the mastoid cells, but no exposure of the dura or sinus. All the cells were exenterated without exposing either.

The walls of the operated cavity looked perfectly healthy except for one dark appearing spot about one-eighth of an inch in diameter in the posterior portion of the inner wall of the antrum, adjacent to the tegmen and posterior to the external semicircular canal. This was cleaned out apparently to our satisfaction. A blood culture taken at this time was negative after forty-eight hours. He was returned to bed in good condition, but during the night was extremely restless, and during the next day complained of a pronounced general headache.

On the 9th the temperature ranged around 102°; pulse around 100; respirations, 22. He had a chill in the afternoon and there was considerable pain in the head. He was very restless during the night.

On the 10th a full dressing was done and the wound looked well at that stage, except for the dark spot spoken of before, and the discharge had a characteristic odor of the colon bacillus. During that day the temperature was 103.4° at 6 a. m., and 100.6° at noon, and 104.8° at 3 p. m., when he had a chill. Later it dropped to 102°. During the night he was extremely restless and delirious at times.

On the next day, the 11th, the temperature at 6 a. m. was 105°; at 9 a. m., 100.4°; at 6 p. m., 104°; pulse 120. A blood culture taken during the day proved to be negative after forty-eight hours, and a spinal puncture developed no microorganisms.

On the 12th there was a rise to 105.2°, which dropped in six hours to 100.3°. In the morning he had a chill. Examination of the blood for malaria was made. During the day he became very restless and noisy and had to have a restraining sheet applied. Dressings each day showed an effort at repair, but a peculiar sweetish odor remained. He was very restless during the night.

On the 13th at 8 a. m. his temperature was 104°; at noon, 100°, and at 6 p. m., 105°. He was irrational, and complained of severe headache. In the evening he had a chill. During the day an examination of his eyes showed some injection of

the fundus vessels, especially the right, otherwise the discs were normal.

On the 14th the symptoms remained very much the same, while the temperature excursion was between 99.6° and 105.8°; and back to 100° in an interval of twenty hours.

During all this time his condition remained remarkably good, with a pulse never higher than one hundred and twenty, and usually one hundred, with respirations from twenty to twenty-four, and while the temperature picture was clearly that of a sinus involvement, the meningeal symptoms were entirely too prominent to be ignored. Other factors also entered to obscure the diagnosis. There were no physical manifestations of a meningitis other than the headache and delirium. The spinal fluid was negative; no help could be obtained from an examination of the eyes. Furthermore, the repeated blood cultures were negative, and so having exhausted all suggestions made by several consultants, who agreed on the probability of a sinus thrombosis against the opinion of the attending physician, who by this time had begun to suspect that his first operation had not been as complete as it might have been, the patient was again taken to the operating room. The first bite of the curette confirmed his suspicions. Attacking the bone at the point of the dark spot before referred to, and removing the roof of the antrum, a flourishing epidural abscess was exposed to view.

This occupied a position in the floor of the middle fossa, about an inch in diameter. On further examination the overlying dura was found to be in a state of acute purulent inflammation, exceedingly thickened and edematous and of a distinct brownish green color. An effort was made to remove sufficient bone to outline the extent of this area of purulent pachymeningitis, and all of the floor of the middle fossa in association with the mastoid antrum and cells, along with the roof of the middle ear cavity, was taken away, as well as a goodly portion of the squamous portion forming the lateral wall. The lateral sinus was exposed back to the occipital suture, and still there was present edematous green dura covered with a seropurulent exudate.

For the purpose of determining positively what seemed must exist, pus beneath the dura, the dura was incised along the margin between the lateral and inferior surface of the

temporosphenoidal lobe for the distance of an inch, and a grooved director introduced for at least an inch in all directions. The blood vessels of the pia were found to be injected and dilated, but no pus or fluid was found. This incision was closed with silk sutures. This demonstrated the fact of the edema of the dura, for it was found to be fully one-sixteenth of an inch thick. Likewise, on account of the marked thickening of the sinus wall, its green color, the exudate covering it and the temperature curve, all suggesting the possibility of a clot within the sinus, it was opened for a distance of an inch, but no clot and no pus were found—there was no interference with the blood current. The sinus dura was found to be in the same condition as that in the surrounding area. There being no indication for further exploration, the sinus was closed by pressure pads and the whole cavity packed with iodoform gauze. It may be of interest to note that a culture of a sinus taken at the operation demonstrated the presence of the bacillus pyocyaneus.

The patient was returned from the operating room in good condition and very boisterous. He had a comfortable night, and from then on proceeded to get well—no pain, no headache, with comfortable nights. He was out of bed on the thirteenth day following the operation. His temperature the day after the operation was 103°, and after that gradually declined to under 100°, where it remained.

The first dressing on the second day showed an effort at repair, the sloughing outer coat of the dura gradually coming away and its place being taken by healthy granulation tissue. A week before his discharge from the hospital the skin was closed with silkworm sutures, but subsequently broke down in the center and then healed by granulation. The middle ear since contains a small granulation over the dura that presents in the uncovered roof.

This case clearly demonstrates the advisability of the exploratory exposure of dura and sinus in cases of suspicion, and the possibility of an epidural abscess and purulent pachymeningitis giving the temperature curve and symptoms of a sinus involvement.

LII.

A LABYRINTH PROBE.

By Frank R. Spencer, A. B., M. D.,

Boulder, Colorado.

Realizing the demand for a labyrinth probe, to be used in surgical procedures upon the labyrinth, and in searching for a fistula of the internal ear, the author devised the probe as illustrated. This may be identical with the one which Dr. Erich Ruttin uses and which is illustrated in his book upon the labyrinth, so the author doesn't claim any originality for this. Since Ruttin's probe cannot be secured in this country, it seems best to have one on the market.

The Spencer Labyrinth Probe.

The probe has been reduced in size so that the delicate olive tip will readily enter the semicircular canals or small fistulæ in the same. This has been thoroughly tried and found small enough for the semicircular canals. It is made of pure silver and can easily be bent to any desired angle. The total length is fourteen and two-tenths centimeters and the maximum diameter of the olive tip is six-tenths of a millimeter. The illustration shows the actual size.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of March 12, 1915.

Four Cases Showing the Results of Modified Radical Operation After One Year.

DR. HUGH B. BLACKWELL: These four cases were cases of chronic discharge of the middle ear.

1. The first patient, for two years and some months prior to operation, had suffered from a chronic running ear with much pain and dizziness. He was treated at the Manhattan Eye, Ear and Throat Hospital for some weeks, and finally, fourteen weeks ago, had an operation performed.

2. The second patient had a double otitis media purulenta chronica—in one ear for two years and in the other for six months—prior to operation. She was operated upon fourteen months ago, and has now no pain, but a certain amount of dizziness still remains.

3. The third patient, a young woman, had also a double otitis media chronica, the left ear having been affected for two years. The ear had a nasty, fluctuating discharge. In all the cases the discharge was very profuse. This patient had been treated for some weeks previous to the operation, with no improvement.

4. The last patient had a chronic running ear for two years before the operation, with no pain. The operation was performed a year and nine months ago.

The same operation has been performed on some eighty-odd cases of mastoiditis where a modified form of blood clot had been employed, and at the conclusion of the operation a plastic flap was cut and the mastoid wound packed with gauze. The operation consists in first cleaning up the mastoid and then taking down the mastoid wall at the epitympanic ring. In one of these cases last year the epitympanic ring

was broken through. The attic of the ear is cleaned out and the ossicles are exposed without disturbing them. Any granulations in the ear are removed at the same time. The plastic flap is cut and the wound dressed as usual.

The operation is somewhat more rapid than the usual radical operation; the cavity is lined with epithelium in a short time. The hearing is not in any way affected by the operation. In none of the cases presented has the patient had any impairment of hearing; indeed, three of them think that the hearing is somewhat improved. Their hearing was certainly very good, as could be demonstrated by anyone who wished to test it.

Dr. Blackwell said that he claimed no originality for the procedure. Dr. Bryant had read a paper on the subject some years ago. It was very much the same as the Heath operation, though the attic is somewhat more exposed. There seems to be a field for the procedure rather than for the radical operation, which has fallen somewhat into disfavor for such wide use. Perhaps in some instances that would otherwise be operated upon by the radical operation, this procedure would give the desired results of a dry ear with the added advantage of a functionating ear.

Salivary Fistula Complicating a Simple Mastoidectomy.

Dr. Cornelius Doremus Van Wagenen: H. K., male, admitted to the service of Dr. Arthur B. Duel, at the Manhattan Eye, Ear and Throat Hospital, July 27, 1914, suffering from an acute middle ear and mastoid suppuration, induced and developed by four days of prolonged surf bathing. Myringotomy and a twenty-four hour observation affording no relief, a left simple mastoidectomy was performed. A particularly long, wide, and pneumatic mastoid was uncovered and found to be extensively involved by a streptococcus invasion. Not only was a posterior right angled incision requisite, but also a prolongation downward of the usual curved postauricular incision, in order to thoroughly expose and exenterate all purulent foci, especially in the elongated tip. Twenty-four hours later a rectal temperature of 106° F. was recorded, but the patient merely "felt hot." Dr. Van Wagenen then left the service on his vacation, but during his

absence the patient passed through an erysipelatous attack and made an uneventful recovery. He was discharged from observation in the first days of September. In the following December he returned to the hospital for a submucous resection for left deviation of the nasal septum. On recovery he first noted the presence of moisture on the left side of the neck, and attributed it to his nasal operation. This fluid discharge, varying in amount, only obtained during yet always accompanied mastication, and became so troublesome at times as to require it to be caught in a handkerchief applied to the neck. Two weeks ago today he gave a practical demonstration in the hospital clinic by munching an apple. Later, an attempt to supply fluid to Dr. James G. Dwyer for examination failed, owing to salivary exhaustion induced by a hearty meal one hour before the test. Returning, starved, the next day, he responded promptly to the test meal. This plan has been followed tonight for purposes of demonstration. (Successful demonstration on eating some sandwiches.)

In the March, 1914, issue of the *Annals of Otology*, Dr. Corrado Canesteo, Institute on Special Surgical Pathology of the Royal Institute of Genoa, reports five cases of parotid fistula. Several theories, based on traumatism, on inflammation, are therein advanced in explanation of this rare occurrence. As pointed out in the article, the gland is usually considered outside the surgical field of a simple mastoidectomy. It would seem that both theories might be advanced in any explanation of this particular case—i. e., that a primary traumatism happened during the course of the surgical attack on the tip; that an inflammation walled off a portion of the gland with the establishment of a fistulous tract in the forming scar tissue; that this tract became temporarily obliterated through the pressure of the retaining head bandage and later became reestablished, partly through resolution of the overlying cicatrix, partly through the pressure of retained secretion periodically stimulated to activity by the act of mastication. The unusual downward thrust of the mastoid tip, with high insertion of the sternocleidomastoid muscle, to which the gland is in part adherent, a possible anomalous relation of the gland thereto, and the mechanical pull exerted on the cicatrix during the maxillary movements, may be classed as further contributions to this remote result.

While the cases embraced in Dr. Canesteo's report seemed to yield promptly to a variety of treatment—i. e., injection of iodin, theromautery, etc.—this fistulous tract has so far defied every probe, even the use of a fine horsehair introduced under a lens. These obliterating methods will be applied, but, in the event of failure, excision of the tract with attempted primary union will be practiced.

DISCUSSION.

Dr. Dwyer said that the analysis showed a perfectly normal saliva.

Chronic Labyrinthitis Due to Cholesteatoma.

Dr. L. M. Hurd: The patient, an Italian, aged eighteen years, had otitis media suppurativa chronica on the left side, following measles in infancy. When she came under observation on November 27, 1914, the ear was discharging and she complained of severe vertiginous headaches on the left side. One week before, a facial paralysis had developed, followed by increased headache. The external auditory canal was stenosed; mastoid not tender; all hearing tests, negative. Rotation to right, fifteen seconds; left, three. Caloric test, negative. Temperature, 99°; pulse, 81.

Operation, December 1, 1914. Sinus, superficial, and less than half an inch behind aural canal. There was a cholesteatomatous mass one-third of an inch below the cortex filling the mastoid and tympanum. The facial nerve was exposed at the angle and I uncovered from it there downward for a quarter of an inch. The sinus was exposed, but the inner posterior table was left. There was a mass of granulations found in the solid triangle an eighth of an inch in diameter. The semicircular canals were soft, but there was no fluid pus. These were removed with the curette, exposing the dura down to the internal meatus. The stapes were removed and found to be roughened. The bone between the round and oval windows was removed. The carotid canal was eroded, exposing the artery. The operation occupied an hour and twenty minutes.

The next day the patient suffered from frontal headache, vertigo and vomiting. On December 3d the headache was better. On December 4th there was partial action of the fa-

cial nerve. On December 8th a Pansa flap was made and the wound was sutured.

December 21st a small skin graft was applied. On January 25th the ear was dry.

Results in Fracture of Base, Rupture of Middle Meningeal Artery, Otitis Media Purulenta Acuta Developing and Infecting Area of Fracture.

DR. L. M. HURD: The patient was an old man who fell down stairs on February 10, 1914, and fractured the base of his skull. Two days after the injury he was taken to a general surgical hospital and a decompression operation was done in the parietal region. The meningeal artery had been ruptured. This was tied off. He remained in the hospital about twelve days, and was sent home in a semiconscious condition.

He remained at home for about two weeks, when a swelling developed over the area of the operation and he came under Dr. Hurd's observation. At that period he was at times wildly delirious and had to be restrained much of the time; at other times he was calm.

An incision was made beyond the swelling, and a large flap was turned down. There was a large collection of pus on the dura, which came from the direction of the tympanum. A radical mastoid operation was done, and a sequestrum about half an inch in length was found, running from the edge of the decompression to the tegmen antri. The sequestrum was removed, the wound sewed up, and the patient made a perfect recovery.

He had no memory, however, from the time of the operation until about eight weeks afterward. One of his delusions was that he would not eat, and for a time he had to be fed forcibly.

According to the history given by his son, he remained more or less delirious until about a week before Easter (April 5, 1914), when he began to improve gradually, and became wholly rational in about two weeks. At present he can read all day, though he complains of a rumbling noise in his ear.

Dr. Hurd said that until this evening he had not seen the patient for a year, and had never seen him excepting when he was delirious.

Replying to a query about aphasia, Dr. Hurd said that the

man had no aphasia, so far as he could tell, when discharged from the hospital.

DISCUSSION.

DR. KOPETZKY asked whether any labyrinthine tests were made.

DR. HURD replied: No.

DR. KOPETZKY asked whether he had understood that the labyrinthine tests were made and showed no reaction when patient was turned. What about the turning effect on the healthy labyrinth of the opposite side?

DR. HURD replied: Fifteen seconds; no reaction at all.

Paper: A Case of Acute Meningitis, Associated With Acute Suppurative Otitis Media, Both Produced by Streptococcus Mucosus Capsulatus.*

BY ROBERT L. LOUGHRAN, M. D.,

NEW YORK CITY.

A Case of Acute Exacerbation of a Chronic Mastoiditis With Cholesteatoma, Extensive Epidural Abscess, Purulent Pachymeningitis With Exploratory Incision of the Dura and Lateral Sinus—Recovery.†

BY ROBERT L. LOUGHRAN, M. D.,

NEW YORK CITY.

DISCUSSION.

DR. DWYER said that in the last two years he had seen twenty-two cases of purulent meningitis and had kept complete records of them. Most of these infections were of the streptococcus mucosus type. A paper reporting them was in course of preparation.

Dr. Loughran was of the opinion that in the first case reported by him the otitis was secondary to the meningitis. This would be very unusual. In view of the cases he (Dr. Dwyer) had seen, the meningitis was due to the otitis. In four of his cases that came to autopsy, direct extension could be demonstrated microscopically, although macroscopically the dura was normal and the path of infection could not be

*See page 673. †See page 676.

traced. In the case under discussion, if granulation tissue was present in the antrum, no doubt a culture would have demonstrated the presence of the organism at the time of operation.

Dr. Dwyer was of the opinion that the spinal fluid in this case had been turbid for days and that, as usual in infection with this type of organism in meningitis, the clinical symptoms associated with meningitis were either absent, or presest only just before death.

In the second case, he did not think a diagnosis of purulent meningitis should be made. It was a case of extensive pachymeningitis, but not meningitis in the usually accepted term, and had not become generalized. He did not think a diagnosis of purulent meningitis should be made unless there are cerebrospinal changes.

Dr. Kopetzky agreed with Dr. Dwyer in the summing up of the second case, and said that he laid much stress upon the symptom of headache which that case presented. He recalled the cases of ambulatory meningitis reported by Dr. Berens at the American Otological and also at the Triological Society, in which the most characteristic symptom, and in fact the only symptom until the terminal stage was reached, was persistent headache.

The other case should not be termed a purulent meningitis, and even though the extent of the area involved was very marked, it was really only a pachymeningitis externa.

Speaking of the other cases of Dr. Loughran, he pointed out the significance of experimental work on meningitis, and stated that in the majority of instances the meninges are infected by the hematogenous route. In the majority of autopsies where meningitis had taken place prior to death the greatest pus collections are not found adjacent to the affected ear, which would be the case if the meninges were infected by contiguity. In the case cited he did not think the otitis was independent of the meningitis, but that it was the result of the otitis, and simply belonged to the group of cases to which Dr. Berens had given the name ambulatory meningitis.

Dr. Loughran said that he would like to ask Dr. Dwyer if another point in the history could have had any influence in the possible invasion of the infection.

The boy had been vaccinated on the first of October and

had a very severe reaction. He was sick in bed for a week. He had spent the summer in camp in Canada and had come back to school in the fall in good shape, although he had been losing some weight.

In regard to the headache, the boy described it by saying, "That his whole head ached." From the fact that acute meningitis produced by the streptococcus mucosus capsulatus frequently develops without any apparent evidence of a point of invasion, and from the fact that in this case there was a mild otitis, it seemed that the acute otitis may have been simply an incident associated with the development of the meningitis and not the actual cause of it.

Report of a Case of Cavernous Sinus Thrombosis.

DR. S. J. KOPETZKY: S. M., aged three years, male, after an attack of otitis media, four weeks later developed acute mastoiditis, for which simple mastoidectomy was performed February 1st, at the Manhattan Eye and Ear Hospital. For fifteen days pulse, temperature and respiration and general condition showed nothing abnormal. There had been no exposure of sinus or dura at the operation. On February 15th sudden rise of temperature to 106°. Blood count and blood culture taken and both negative. The clinical picture presented by the drop and subsequent rise of temperature and the absence of all other igns made the case look, from the clinical side, as one of sinus thrombosis, and without waiting for further reports from the laboratory, the jugular was resected and the sinus examined. No clot was demonstrable and the jugular vein was found normal (subsequent report). On February 18th a lumbar puncture was taken and the fluid was found normal except that the copper reduction was absent. On February 19th another lumbar puncture gave a similar finding. A suspicion that meningitis was developing was then entertained. Meanwhile other symptoms developed: marked edema of both eyes, swelling of the conjunctiva and typical septic temperature. The eye grounds reports as normal. Another blood culture now was found positive after forty-eight hours—streptococci—and a cerebrospinal fluid became absolutely negative, the copper reduction being present and normal in its reaction. The patient died. No autopsy was permitted.

In commenting on the case, Dr. Kopetzky said that conceivably a thrombus had extended from the bulb into the petrosal and from there into cavernous sinus. He did not believe it a case of meningitis.

Paper: Report of a Case of Traumatic Mastoiditis.*

By C. Johnstone Imperatori, M. D.,

New York City.

DISCUSSION.

Dr. Imperatori said that he did not go any further on account of the condition of the patient. Taking into consideration the age of the child, and knowing the difficulty in some cases in finding the jugular in children, it seemed best to discontinue the operation. He agreed with Dr. Kopetzky regarding the blood culture. There should be at least five cubic centimeters, and if possible ten cubic centimeters, of blood secured; this blood is then spread through one hundred and fifty cubic centimeters of culture media.

Paper: Infection of the Ear With Vincent's Miscroorganisms—Report of Sixteen Cases.†

By J. A. Mulholland, M. D.,

New York City.

DISCUSSION.

Dr. Kenefick congratulated Dr. Mulholland on the manner in which he had presented the subject of Vincent's spirillum. While in former years there was only an occasional case at the Foundling Asylum which fits the description of those recently studied, still some must have occurred from time to time which went on to a fatal ending without having its true nature recognized. These cases of Vincent's infection are very interesting to study. Recently he had seen several cases in adults, affecting the pharynx, which very nearly terminated fatally. The cases which Dr. Mulholland had reported, of course, occurred in infants, and, moreover, in institutional infants, where the infection is especially de-

*See page 660. †See page 485.

structive. The picture is one which, once seen, is never forgotten, and the odor once smelled is not soon forgotten, for it certainly suggests an extraordinary infection. Necrosis in the external canal is often extensive, affecting the soft tissues and bone and spreading into the mastoid and surrounding tissue. He had in the past operated on these cases in the hospital, and had always regretted making any new opening through which the infection could extend. In the usual mastoid operation, for instance, the end was hastened by the fresh wounds made. There was no means by which the terrible destruction could be controlled. Now, if it is found that in salvarsan we have an agent by which it can be controlled, the future is bright for these cases. Dr. Mulholland's statistics were certainly most encouraging.

In the beginning the salvarsan was tried in the powder form. Dr. Mulholland would doubtless state whether he used it in the powder form without venous injection, or whether he depended on the venous injection to control the infection. Dr. Kenefick said that he had recently learned that the application of salvarsan in a five per cent mixture with olive oil was very effective, and if this form can be tried out and found effective, it will be a most acceptable method of treatment—better by far than intravenous injection, which is not at all an agreeable procedure with infants, and especially in female infants, for it is almost sure to leave a scar which lasts even late in life.

The lesson taught by Dr. Mulholland's report is that in any case which presents in auditory canal, middle ear, mastoid or pharynx an unusual destruction of tissue with an odor of extraordinary necrosis and which refuses to be cleaned up by antiseptic irrigation or the usual methods indicated, we should hunt for the Vincent spirillum; and, having found it, it is to be hoped that salvarsan locally applied will be effective without calling for intravenous injection.

Dr. Kenefick said that it was his impression that in past years at the Foundling Hospital this organism had been grafted upon very virulent infections of the ear following infectious diseases, especially scarlet fever, and that in future Dr. Mulholland may be able to give more information on this point. There is no doubt about its contagiousness, and it will

be interesting to find whether it occurs more frequently in suppurative ear conditions following the infectious diseases.

DR. MULHOLLAND said that in his opinion it is quite common, but that it is not generally recognized. The average man seeing a bad throat will take a culture, and the culture will not show the organism. One has to take a smear. He had received a report from the Michigan State Board of Health, showing that six hundred and eighty-seven swabs were sent in for suspected diphtheria, and of these there were two hundred and forty-two cases of true diphtheria, or twenty-eight per cent. The Klebs-Loeffler bacillus was found in two hundred and forty-two cases; and of these six hundred and eighty-seven cases there were one hundred and seventy-eight cases in which the Vincent organism was present. Here in New York a man will take a culture and send it down for examination, and if the report comes back negative he is delighted and will never give it a thought.

The point that Dr. Kenefick had brought up of its being contagious was certainly true in institutional life. One never sees it in a normal healthy child, but institutional life favors its development. In the New York Foundling Hospital, where there are eight hundred children, it is frequently found; but there are many children out, and none of these have it so far as known.

Mr. Mulholland said that they were using salvarsan in doses of two-tenths of a gram up to the age of five years. It had been tried with glycerin but not with olive oil. Most satisfactory results were using it intravenously.

DR. DWYER, replying to Dr. Wilson's inquiry, said that they had intended later to look into the question of whether the bacillus was of the bovine or the human type.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOLOGY.

Meeting of April 9, 1915.

Otitis Media Purulenta Chronica With Labyrinthine Fistula.—Symptoms Relieved by Radical Operation.

DR. ISIDORE FRIESNER: D. F., aged nineteen years. Early in September this patient came to Dr. Phillips' clinic at the Manhattan Eye, Ear and Throat Hospital. He gave the following history: The right ear had been discharging since childhood. The discharge was foul, but not abundant. Recently the discharge had increased somewhat, and there were occasional attacks of vertigo and shooting pains behind the ear.

Examination.—Left ear, normal. Right ear, no edema or tenderness of mastoid. External auditory canal broad. The lower portion of the inner tympanic wall epidermatized. In the upper portion, part of the hammer handle present adherent to the inner tympanic wall. In the region of the posterior fold a few small pale granulations protruded from the attic. From these granulations a drop of not very foul pus oozed.

Functional Examination.—Weber to right. Rinné, right, negative; left, positive. Schwabach, right prolonged. With the noise apparatus in left ear he could hear soft whisper (right) at several feet. Spontaneous rotatory nystagmus to both sides; more marked to right (diseased ear). Rotation to right, nystagmus eighteen degrees; rotation to left, nystagmus seventeen degrees. Caloric, right positive. Fistula test positive and typical in so far as compression aroused a nystagmus to the diseased ear. Aspiration was negative.

September 29, 1914, radical mastoid operation. Sinus very superficial and rather far forward. Antrum and aditus contained neither pus nor cholesteatoma. The bone of the inner aditus wall was softened, and in this region a few pale granulations were found. In the posterior limb of the external semicircular canal there was a large fistula. The canal was open for probably a third of its circumference. Aside from

an intercurrent erysipelas, which, however, did not interfere with the healing of the postauricular wound, recovery was uneventful.

There was no postoperative increase in the spontaneous nystagmus, and the vertigo disappeared rapidly after the operation.

October 31, 1914, about one month after operation, hearing (tested with noise apparatus) as before. Spontaneous nystagmus still present. Fistula test negative.

January 2, 1915, radical cavity completely epidermatized. Occasional vertigo. Tested with noise apparatus shows ability to hear low whispers at eight inches (right). Spontaneous nystagmus toward both sides, more marked to the right (the diseased side). Rotation to right, nystagmus thirteen seconds; rotation to left, nystagmus twenty seconds. Caloric positive and prompt with the head in the optimum position.

DISCUSSION.

DR. KOPETZKY cited the case with parallel symptoms and outcome which he announced he would report in detail later. The patient came under observation at the Manhattan Eye, Ear and Throat Hospital suffering with otitis media purulenta chronica, and during the course of his treatment the onset of an acute exacerbation accompanied with acute labyrinthitis was noted. While under observation the onset of spontaneous nystagmus and other symptoms showing labyrinthine infection were noted and studied. The progressive increase in deafness up to total loss of hearing was seen, and finally a positive fistula test was obtained. The patient was put to bed until the acute exacerbation and the stormy clinical picture had subsided, and was then submitted to a radical mastoid operation, exactly in accord with the method indicated tonight by Dr. Friesner—i. e., no interference with the labyrinthine capsule, no curettement of the granulations at the fistula. Noteworthy in this case were that there were two distinct fistulas—one in the horizontal and one in the posterior vertical in close proximity to the ampula. The man made a perfect recovery and now has a dry ear. His labyrinthine function is, of course, lost. At this date compensation is beginning to be evident when he is tested.

DR. DANZIGER asked Dr. Friesner if the nystagmus in-

creased at the onset of the erysipelas, as Ruttin described such a nystagmus as due to a collateral edema in the labyrinth.

Dr. Friesner replied that he had not mentioned that point, which was interesting, but that there was no change in the spontaneous nystagmus.

Dr. Byrne asked if Dr. Friesner would particularly describe the nature of the nystagmus. Spontaneous nystagmus is that which manifests itself without the patient turning his eyes to an extreme degree in any direction. Extreme deviation to the right or left will develop nystagmus in the direction of the deviation in almost any person, and more especially in persons with defects in the external ocular muscles. This fact he had observed for years. He noticed, again, that in the compression symptoms in the fistula test there was nystagmus to the left as he had understood; and then under anesthesia the compression produced conjugate deviation to the right. This would argue that in the first test only very mild irritation was caused in the ampulla of the right horizontal canal, whereas under anesthesia the irritation was greater, causing a greater and more sustained effect upon the hair cells in the ampulla. This in turn caused the conjugate deviation of the eyes to the right. That seems to be the explanation of the phenomena.

It would be interesting to have another point cleared up. He had not seen these rotation tests as made by otologists. He had not much faith in rotation tests from the neurologic point of view. Other neurologists besides himself have little faith in them. Cushing and his assistants have gone to the trouble of seeing Bárány himself demonstrate his tests, and they frankly admit that, so far, the tests have proved disappointing. The physiology of the rotation tests is quite clear, but otologists always mention that nystagmus occurred after twenty seconds, etc. That is where he is inclined to take issue with Bárány, for the time element, taken by itself, is immaterial. What is material is the alteration of pressure of the labyrinthine fluid against hair cells, and it is not the time element that secures this, but, as Dr. Byrne himself has shown, the suddenness of the starts and stops in initiating or terminating a movement of rotation.

DR. FRIESNER replied that he could not answer all of Dr. Byrne's questions, but that the doctor was mistaken in his original premise. In giving the history of his case he had stated that when the patient was on the operating table, and not yet anesthetized, the fistula test (compression) was performed, with the result that the nystagmus was directed to the diseased ear. The nystagmus has a slow component in one direction, followed by a rapid component in the opposite direction. We have a fairly accurate understanding of the origin of that component. We do not know definitely—although Prof. Pike states that the origin of the rapid component is in the temporal lobe, we do not know definitely the orgin of the rapid phase of nystagmus; but when a patient is unconscious—whether he has a spontaneous nystagmus or his labyrinth is artificially aroused—he has no nystagmus. In other words, what would be a nystagmus in a state of consciousness is, when he is unconscious, a slow movement, a conjugate deviation of the eyes in the direction of the slow component. The anesthesia or the unconsciousness abolishes the rapid component of the nystagmus. So in the case reported the fistula test (compression) was again made when the patient was anesthetized, and there resulted a slow conjugate deviation of the eyes toward the sound ear. It would take a great deal of time to go into the physiology of the rotation tests.

Dr. Friesner said the nystagmus is always named in accordance with the direction of the rapid component. A slow component in the direction of the sound ear would be followed by the rapid component in the other direction, when he said his nystagmus is directed to the diseased ear.

DR. BYRNE: I understood you to say that in the fistula test, before an anesthetic had been given, there was nystagmus to the left.

DR. DENCH said that at the Neurological Institute, where he had had the opportunity of examining tumors of the cerebropontine angle, they never failed to locate them by the rotation or the caloric test.

DR. BYRNE replied that we have accepted Bárány's explanations, at least in so far as they apply to neurologic diagnosis and localization, much too readily.

DR. FRIESNER said that one of the important facts estab-

lishing a diagnosis of cerebellopontine tumor is the absence of caloric irritation in the labyrinth of the diseased side.

DR. KENEFICK asked if a smear or culture had been made, and if so, what was the report.

DR. FRIESNER replied that there was neither pus nor cholesteatoma in the antrum or attic; simply a little softened bone in the aditus, with a few granulations.

DR. KENEFICK said that the intercurrent nystagmus preceding erysipelas, as noted by Dr. Ruttin, was a very interesting point. Recently in his own service at the Eye and Ear Infirmary, the house surgeon called up the attending surgeon and reported that his case was developing a marked nystagmus, and in the afternoon that patient developed erysipelas. The occurrence of erysipelas in almost any mastoid wound seems to have a very wholesome effect on infections of all characters. In the past fifteen years, in his own service and in Dr. Dench's large service, he had never seen a case complicating mastoiditis—which under the rules are always sent to Bellevue—in which the patient was not returned improved by his erysipelas, however much he may have been depressed by it at the time. Possibly in Dr. Friesner's case of fistula, the erysipelas infection might have exerted a helpful influence in saving the patient.

DR. FRIESNER, replying to Dr. Kenefick's suggestion, said that he was very glad that the patient did not know he had had an erysipelas, for if we follow Dr. Kenefick's reasoning a trifle further, we must believe that the erysipelas cured the patient, whereas now the patient believes that the operation cured him, and he is very grateful.

Paper: A Case of Otitis Media and Mastoiditis Followed by Meningitis—Operation—Recovery. After Eight Years, Development of Cerebral Abscess—Operation—Death.*

BY S. J. KOPETZKY, M. D.,

NEW YORK CITY.

DISCUSSION.

DR. PERKINS cited a somewhat similar case, only that the patient is still alive. A secondary mastoid operation was performed on a child of six, and some four or five days later

*See page 566.

he was seized with convulsions and became comatose, so remaining for six or eight hours. It was evident that he was about to die, and a decompression operation was done, and the child recovered. The case was reported before the section, and the consensus of opinion was that the child had meningitis and that the decompression operation relieved him and he got well. About a year or a year and a half later he developed the same symptoms, became unconscious, had convulsions—mostly of the leg and arm of the opposite side from the decompression operation. Dr. Perkins said that he was away at the time, but Dr. Smith, his colleague, on Dr. Dench's staff at the New York Eye and Ear Infirmary, took charge of the case and explored the brain, and found an abscess located at some depth from the surface. As soon as the abscess was drained the symptoms cleared up and the patient got well and remains so today.

DR. DANZIGER asked whether or not there was any fetor to the pus at the time of the first operation which might have indicated its origin in the brain tissue.

DR. KOPETZKY replied: Streptococcus capsulatus mucosus.

DR. DENCH asked Dr. Kopetzky where the pus came from in the second operation. He understood the doctor to say that he did not find pus in the brain. Where was it located if it did not come from the brain?

DR. KOPETZKY, replying to Dr. Dench, said that at the time of the operation he and Dr. Imperatori, his associate, had had a difference of opinion as to the origin of the pus. Dr. Imperatori thought that it came from the tympanic cavity. Dr. Kopetzky thought it came from the brain, but he could not find the point of egress. There was very little of it at the time. At the second operation there was no doubt as to its place of origin—it came from the temporosphenoidal lobe.

DR. DENCH said that a decompression operation, to be of any value, must have a very large exposure. He had little confidence in parallel incisions and decompression operations. In a decompression operation a very large incision should be made in the dura so as to allow prolapse of the brain, thus affording relief to intracranial pressure. Cushing is in the habit of excising the dura over the entire area of exposure. In the case reported by Doctor Kopetzky, the decompression would seem to have been competent, as the child lived seven

years after the operation. As a general rule, however, free incision of the dura, or even excision of the dura, must be practiced in order to secure satisfactory decompression.

Dr. Sharpe said he had nothing to add to the discussion excepting that the decompression operation is used much more now than formerly, especially in cases of brain abscess and cerebral tumor, and particularly where the temporosphenoidal lobe is supposed to be the site of the tumor. As for the incision, there seems to be no doubt, from the standpoint of neurologic surgery, of the superiority of the vertical over the transverse incision. If the vertical incision is made over the squamous portion of the temporal bone, and then the temporal muscle retracted, an area of two and a half to three inches in diameter can be exposed and the entire temporosphenoidal lobe can easily be explored. The attachment of the temporal muscle to the parietal crest is not destroyed, and thus a firm closure is obtained. The reason so many herniæ are seen is that the operator using the transverse incision does not take into account this attachment of the temporal muscle, and if there be high intracranial pressure, there is sure to be a subsequent hernia. Then, too, the vertical incision permits better drainage than the transverse incision, in that the drain can be inserted at the lowermost portion of the temporosphenoidal lobe.

Dr. Dench said that he had done both operations, and while he agreed with Dr. Sharpe that in a case of brain tumor the incision which he recommends (which is Cushing's incision) is an advantage, yet where there is an abscess and we have to drain, he believed the operation by the old curvilinear incision was the better. He had done both operations, and has had better results and has had no more herniæ from the one than from the other, if the asepsis has been perfect. In the pus cases the horseshoe incision is the better. For the brain tumor there is no question that the vertical incision is the better.

Dr. Kopetzky said that in the more recent cases he had operated upon he had made an osteoplastic flap to reach the abscess and had later replaced the flap with good results. Nine years ago he was not doing that, but he now believes that this is the correct procedure. He had reported cases which had been operated upon with exactly the same technic as he

had used in this case, and some of them had recovered; nor did he get more brain herniæ with the horizontal incision into the dura than with a vertical incision. Since adopting the osteoplastic flap method he had used it for abscesses in the occipital lobe and in the frontal region, and he believes this method the best means of approach. He thought that the technic of handling the hernia in a case he had reported may have had something to do with the subsequent degeneration of the brain tissue and the formation of the abscess, and he frankly confessed that he knew less about the subject eight years ago than he knows today.

Paper: Facial Contractions During Radical Mastoid Operation.*

By Chas. E. Perkins, M. D.,

New York City.

DISCUSSION.

Dr. Dench congratulated Dr. Perkins, not only upon the clinical report made, but also upon the value of his anatomic studies. There were certain clinical facts which those studies had made clear. In a case of radical operation, after the bone had been cleared from the surface of the mastoid, the anesthetist, who was an expert, reported that there was a facial twitch. The patient was a child about twelve years of age, and there may have been a persistence of the superficial branch; there must have been traction on the nerve and irritation of the facial nerve, for the anesthetist was accustomed to the operations, and noticed the facial twitching. That is the persistence of a branch of what is the normal distribution in the infant.

Speaking of facial paralyses which have occurred in the radical operation in which he had not always had a twitch, Dr. Dench said that the worst case he had ever seen was one in which he thought he had done a perfect operation, with the aid of an expert anesthetist. When he told the anesthetist that there was a facial paralysis, the anesthetist replied that it was impossible, for there had been no twitch. It could only be explained by there having been a hemorrhage into the fallopian canal.

*See page 664.

In another case in which he was doing an ossiculectomy for chronic otitis media, the patient suddenly asked: "Doctor, what is the matter with my face?" She had an absolute facial paralysis simply after an ossiculectomy. In that instance there was probably a sudden hemorrhage into the facial canal, caused by drawing upon the chorda tympani nerve. These were three cases of unusual symptoms following operations on the middle ear.

In the first there was continuous facial twitching, beginning as soon as the skin incision was made and continuing throughout the operation when the superficial structures were touched, showing a persistence of the infantile type. In the second there was no evidence of injury during the operation; and in the third there was a facial paralysis which persisted, due to traction on the chorda tympani nerve.

Dr. Bryant: Everybody seems to agree that twitching of the face is an important sign in the radical mastoid operation. In his experience it has not been infallible. He has seen cases of facial twitching at a moment when the curette was not near the course of the facial nerve. Perhaps the twitching was due to transmitted pressure, or possibly, as Dr. Perkins says, to the traumatism of the chorda tympani nerve, or to something else, but surely not due to direct traumatism of the facial nerve. Dr. Dench, in speaking of the twitching symptom, has mentioned an interesting case of his in which the facial nerve was destroyed, but no twitching of the face was observed. The worst case of facial paralysis that he has ever seen showed no twitching of the face at the time of destruction of the facial nerve. He was watching the face, and he is positive that it did not twitch. The case was one of very extensive osteomyelitis of the temporal, occipital and parietal bones. Everything was afloat, and during spooning out the softened bone the facial nerve was torn across, and the two ends of the torn nerve were left floating in the wound. This was a case of traction, not compression, injury of the nerve.

Dr. Sharpe said that ordinarily any irritation of the nerve would cause a twitching, unless the nerve was pathologically impaired. It seems probable that in some of the mastoid cases the facial nerve is already affected and therefore it would not be easily affected by external stimuli.

Dr. Bryant replied that the facial nerve was completely

severed in the case which he cited, in spite of which there had been no twitching of the face. On account of this experience, Dr. Bryant had been especially careful to avoid injury of the facial nerve by having the wound kept clear and clean. Under these circumstances it would be difficult to injure the facial nerve to any considerable extent without the knowledge of the operator, whether the face twitched or not. This case of osteomalacia had an interesting convalescence. After two and a half years there began to be some spontaneous motion of the facial muscles, which continued to improve for two years, finally leaving the face restored to almost perfect motility and tone.

Dr. Dench said that he had had one case of facial paralysis which demonstrated the difference between injury of the nerve external to the geniculate ganglion and injury of the nerve internal to the geniculate ganglion. In this case there was an epidural abscess, and the abscess lay very close to the internal auditory meatus. There was also a large superficial swelling at the tip of the mastoid. When the patient came out of the ether there was complete facial paralysis. It was a question as to whether the nerve had been cut as it emerged from the stylomastoid foramen, or whether it had been injured close to the internal auditory meatus. We know that if the facial nerve is injured external to the geniculate ganglion, regeneration either does not take place or occurs very slowly. If the injury be internal to the geniculate ganglion, the function of the nerve returns very rapidly. In this particular instance the taste test, carried out by Dr. Perkins, confirmed the hypothesis that the nerve had been injured internal to the geniculate ganglion. Full restoration of function occurred in three weeks.

Dr. Byrne said that he did not see the point made by Dr. Dench in speaking about the facial nerve. The geniculate ganglion is related to the sensory portion of the seventh as the analog of one of the posterior root ganglia on the spinal nerves. It is not related to it as the anterior horns are related to the anterior roots of the spinal nerves. There was something to be said about the rapid regeneration of the seventh nerve after injury or division. Head has done a great deal of work on nerve regeneration after injury or section. This work has not been accepted on the continent. The

trouble with such work as Head's and Bárány's is that it requires years of special preparation, and after that it requires much time and abundant opportunity. The result is that few find themselves in a position to corroborate the findings. Head, in his papers on the regeneration of the peripheral nerves, states that after section of a nerve protopathic sensibility to prick returns in from eighty to one hundred days. If after a nerve injury regeneration has not taken place in this period he adds forty days, during which the surgeon must wait to see if the nerve is actually divided; if sensibility to prick does not return in one hundred and forty days, then operative procedures should be resorted to and the nerve sutured, etc. Probably every surgeon has had cases where, even after complete severance of a nerve, regeneration has taken place in a much shorter time than Head allows.

Dr. Byrne said that he is now studying that question on several cases where the nerve was sutured after complete severance; in one instance sensibility to prick returned inside of three weeks. This case had been recently presented to the Section on Neurology. In another instance the regeneration is returning almost as rapidly. These and other cases are in flat contradiction with Head's conclusions. He understood that Head's conclusions were never generally accepted on the continent. He understood that different anatomic conditions may obtain in the case of regeneration of the seventh nerve within the cranial cavity, but he did not see why regeneration of the motor portion of the seventh should have any relation to the geniculate ganglion, which has no direct trophic function for the motor fibers of the nerve. He believes that when a peripheral nerve is divided, and left in that condition for some time, there is frequently a better chance for rapid regeneration after suture of the nerve than if it were immediately sutured after division. In one of his cases alluded to the radial nerve had been severed seven years prior to suture.

Dr. Sharpe said that fewer cases of facial paralysis occurring after mastoids are reported now than formerly; this is undoubtedly due to a better operative technic.

As to those cases in which no regeneration has occurred within three years under the expectant treatment of massage, galvanism, etc., then he thought it is not wise to let the paralysis continue longer, but to try an anastomosis of the hypo-

glossal nerve to the distal end of the facial nerve, in order to give a chance for regeneration. The technic for that work has been so improved in the last few years that the results are much more satisfactory. He had had eleven such cases, most of them being of Bell's type of peripheral facial palsy. Of these eleven cases, six have improved—three of them so that one would not know there had been any facial paralysis, and the other three partially; the remaining five have not improved.

DR. DENCH asked what was Bell's type of palsy.

DR. SHARPE replied that it was the term applied to those cases of facial paralysis which had a history of usually having had a cold, and then upon awakening in the morning there was facial paralysis—always of the peripheral type of palsy. Dr. Sharpe said that he would not advise operation before three years had elapsed, but that in the meantime massage, galvanism, etc., should be employed to keep the muscles in as good condition as possible. Any operation within three years would be unwise; cases of improvement after three years are rare.

Dr. Sharpe, replying to Dr. Dench, said that in some of the hypoglossal facial anastomoses there is a temporary atrophy of the homolateral side of the tongue, resulting from the cutting of the hypoglossal nerve. This atrophy rarely persisted longer than six months.

DR. PERKINS asked if the neurologists had made any tests, especially of the taste, with the view of exactly locating the lesion in cases of facial paralysis.

DR. SHARPE replied that as a matter of routine the taste is always examined in cases of facial paralysis, and in only about twenty-five per cent of the cases is it impaired—that is, a lesion of the geniculate ganglion or chorda tympani. The examination of hearing regarding the stapedius muscle would be an interesting observation to make.

DR. PERKINS said that he is studying this question and would like to know the modern view of the question of locating the facial lesion. Of course, from the study of the nerve itself, the chorda tympani comes off very near the stylomastoid foramen, and it is easy to see how a lesion at this point would involve the chorda as well. Bell himself, and other earlier observers, when they tested the taste more than

they do now, found a loss of taste sense on the anterior two-thirds of the tongue; whereas Erb, about 1870, reported twelve cases of what he called "rheumatic facial paralysis," and found that ten did not have loss of the sense of taste on that side, and that two did. Dr. Perkins said that he had been able to test only a couple of cases, one of them being a herpes zoster oticus, and that patient had a loss of taste sense on that side on the anterior two-thirds of the tongue.

Dr. Perkins asked some of the neurologists present to account for his benefit the methods of testing for paralysis of the facial nerve.

Dr. Byrne, replying to Dr. Perkins' question, said that (a) lesions of the facial upper motor neurons caused paralysis of the lower two-thirds of the face on the contralateral side, with only slight paresis of the upper third of the face; (b) lesion of the nucleus of the seventh, owing to the proximity of the latter to the sixth nucleus, almost invariably causes symptoms of sixth nerve disturbance. The facial paralysis includes the upper third of the face and is homolateral. Where the lesion is large, other nuclei and tracts are likely to be involved, especially the pyramidal tract, causing homolateral facial palsy of the peripheral type with contralateral hemiplegia; (c) lesion of the seventh at its exit from the brain axis, and in its course within the skull up to the bottom of the internal auditory canal, is usually caused by syphilitic exudation at the base or by tumors, etc., in the cerebellopontine angle. Here the eighth and other nerves (e. g., ninth, tenth, eleventh and twelfth) are also usually implicated. The aural tests, and especially the tuning fork tests, help to locate the lesion by differentiating it from the comparatively rarer otitic labyrinthitis. In cases of basal syphilitic exudation other evidences of the disease may be found; (d) lesion between the geniculate ganglion, where the chorda tympani, after passing through the iter chorda posterius, joins the facial and a point a short distance above the stylomastoid foramen, where the chorda tympani leaves the facial, gives the characteristic disturbances of taste on the anterior two-thirds of the tongue; (e) lesion in the remaining portion of the nerve may involve the whole nerve or particular branches, but taste is not affected.

A New Electric Mouth Light.

DR. ALFRED KAHN (by invitation): The instrument herewith illustrated represents an electric mouth light, which I have found of marked utility in my practice as an ear, nose and throat specialist. Its advantages are many. I offer this

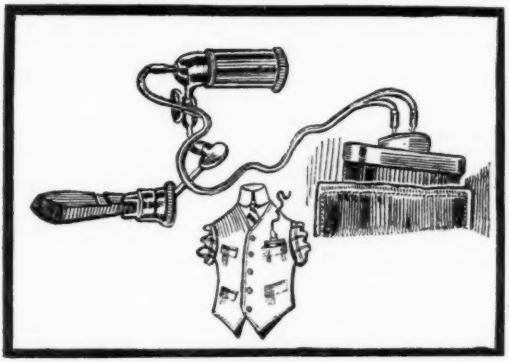

FIGURE 1.

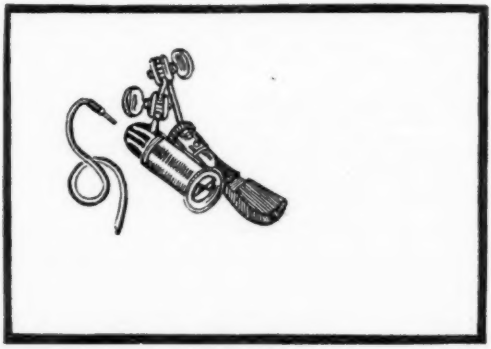

FIGURE 2.

reason for presenting it to you. Its essential features follow:

The cuts make the mechanism and appearance of the instrument clear. The illustration shows the light as being made up of an electric flashlight mounted on a system of hinges (universal joints), the hinges connecting the light with

a fiber mouthpiece, which is grooved to receive the teeth. The instrument, which is extremely light, may thus be held firmly in the mouth. The universal joints enable the light to be manipulated quickly in any direction, where it remains firmly in position. The hands are left entirely free for any operative or other procedure. The light receives its power by means of a dry battery (which can conveniently be placed in the coat or vest pocket); or if desired the instrument can be connected to the regular street current, reducing the voltage by means of a rheostat.

The light is strong and regular. The instrument can be used for any purpose for which our present headlight is used (eye, ear, nose, throat, rectal diseases, vaginal examinations, etc.).

Figure 1 shows the light connected to a dry battery; placed in the vest pocket. Figure 2 shows its compactness; in what small compass it can be folded and tucked away. The battery will burn this light about four hours continuously, long enough for most operations.

The battery and light are regular stock articles and can be secured at any electric store. This light is of special utility at the bedside or where an operative procedure is to be done in a private home. The instrument can be easily sterilized. Its cost is most reasonable.

Paper: Skiagraphs of the Mastoid in Certain Atypical Cases.*

By Harold Hays, M. D.,

New York City.

DISCUSSION.

Dr. Kopetzky said that he felt a word of caution should be uttered in regard to the value of roentgenographs in diagnosing operative acute mastoiditis. When it is borne in mind that in every case of acute purulent otitis media there is a pouring out of serum and exudate into the mastoid cells, and when it is remembered that many such cases while technically an acute mastoiditis are not so clinically nor surgically, and do not require operative interference on the mastoid process, it will be clear that an X-ray picture taken of such a case will

*See page 571.

show cloudiness of the cells as compared to the normal side, and such picture taken by itself would be misleading using it as a criterion for operative indications. If the plates show that the walls between the mastoid cells are broken down, then it is another question. The X-ray of the mastoid process is of more value negatively than as a positive finding for operation, and radiography of the mastoid must take its place with other laboratory aids to diagnosis in that it is of value when it substantiates the clinical picture.

Dr. Dixon responded that what Dr. Kopetzky had said was perfectly true. It is very rare indeed to have a normal mastoid plate in the presence of an otitis media. Almost every acute otitis media will give a hazy plate. It is the degree of cloudiness which counts. The mastoid septa do not have to be broken down in order to make a diagnosis of mastoiditis. When they are broken there is no question whatever. Unless you have a pathognomonic point on your plate, no man has any right to open a mastoid in the absence of symptoms. The clinical symptoms must be used in conjunction with the plate. It is a matter of experience in judging the degree of cloudiness which will demand a mastoid operation. If there has been an otitis media which has cleared up, and the patient still has pain, the question often comes up whether or not the patient should be operated upon. There may be no temperature, but if you find that the mastoid process has become disintegrated to any considerable degree, you have a pathognomonic point and there is then no question about it.

He cited a case under observation which in all probability will be operated upon—and if so will be reported later. This patient had had an otitis media for three or four weeks; the ear is almost dry. It was next to impossible to get any pus for examination. There was a little tenderness over the tip and antrum, and that was all. The case was skiagraphed yesterday. The plate was decidedly cloudy throughout the mastoid region.

Dr. Kopetzky said he would take no issue with Dr. Dixon, in view of the latter's large experience in radiography of the mastoid process, but he would like to have the doctor tell what kind of a picture a radiograph will show in a patient who has had an acute otitis media purulenta and an acute

mastoiditis in which the intercellular walls of the mastoid process were broken down, and yet the patient has recovered from the lesion and gotten entirely well. If one reads the plate alone of such a case a few weeks after the entire recovery of the patient from the clinical standpoint, and one sees on the plate the destruction and the cloudiness as compared with the unaffected side, we would hardly call such a finding pathognomonic and indicative of operative interference, for we know the patient has entirely recovered; so again he finds that the plates alone have little positive value. He agrees with Dr. Dixon that one does not have to have broken down cell walls to have a case presenting indications for operation.

Dr. Dixon said that there is no question whatever that many mastoid cases will recover without operation. We know also that the hemorrhagic type will give as white a plate as a bone that is full of pus; it would seem that pressure has a great deal to do with it—that pressure in a purely hemorrhagic mastoiditis will give as cloudy a plate as one that is filled with pus under pressure. If a patient is improving, and there are no clinical indications for operating, it would be foolish to operate on the evidence of the plate alone, unless there be a pathognomonic point present.

Dr. Dixon said that he had approached this work with a good deal of diffidence, and did not think it of much value—indeed, he was rather forced into it, but that he was now as enthusiastic about its value as anyone in the city; and when he finds from time to time that a bone is degenerating, he believes that the patient is entitled to an operation, whether or not the canal indicates trouble in the middle ear.

The plate should be backed up by the clinical symptoms, and in reading the plate the clinical symptoms should be brought to the plate by the surgeon. All that the roentgenologist can tell is what he sees. Many of the cases, such as Dr. Kopetzky has spoken of, where there is broken down bone and the patients are apparently getting well, if followed up will be found to have sclerosed later. In the instance referred to he had taken at least nine sets of plates. They were large pneumatic mastoids, cloudy throughout in the beginning, but were not opened for lack of clinical symptoms. About two-thirds of each side gradually cleared up, and the balance sclerosed.

DR. KOPETZKY said that two years ago he made a study of secondary mastoid infections which came to the clinic after having been operated upon one or more times. The average operative finding gave a layer of rather dense compact bone, concave in outline, directly under the periosteum, of variable thickness below, inside of which there was degeneration, granulation and very often pus; and this layer of compact bone was usually found incomplete at one or other point, through which the infection very often reached beneath the skin.

He said he did not doubt that were pictures taken of such cases, either before or during the secondary infection, they would have shown a dense compact bone picture, and he therefore doubted the interpretation that Dr. Dixon put upon such plates. A definite scientific study is in order on this topic, and the plates should be taken at definite intervals during the postoperative period, running a course of a year or two; then some idea as to the processes of regeneration would be obtained.

DR. CHAMBERS asked what was a hemorrhagic mastoid.

DR. DIXON replied that it was one in which the cells were filled with blood, not pus. The patient (to which he had referred) was twenty-six or twenty-seven years of age, with large pneumatic mastoids, and they were cloudy from the antrum down to the tip. No operation was done on either side, for the clinical signs did not warrant it. The case was followed from month to month, and the filling in could be observed as it developed. The outline of the old cells could still be seen, though filled with bone. He felt as satisfied about this as though he had cut into them.

DR. HAYS said that Dr. Dixon's plates of these cases had proved of material aid. It is very valuable in diagnosis to obtain a good X-ray picture. In a good many cases where the diagnosis is in doubt the X-ray will clear the situation. In three of these cases operations were done. In two there was no temperature, pain or tenderness, yet there was an acute mastoiditis which would not have gotten well without an operation. In the last case there was a slight cloudiness of the mastoid, but the clinical picture showed that the patient was getting better, so no operation was performed.

When Dr. Dixon gave his demonstration of X-rays of the

mastoid before the section, he showed so many pictures that it was difficult to appreciate the essential points. Dr. Hays said he wished to show these four cases, as each one of them proved distinctly the value of this procedure in corroborating the clinical symptoms. He said that he did not think for a moment that one should be entirely guided by the X-ray, but there are frequently cases which are in doubt and where any aid to diagnosis is of a great deal of value. It is in just such cases that he believes the X-ray probably will help to interpret all the important symptoms, which means a great deal.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, Held February 16, 1915.

DR. GEORGE W. BOOT, PRESIDENT, IN THE CHAIR.

Specimen of Lymphangioma.

DR. J. R. FLETCHER showed a specimen of lymphangioma which was removed in August, 1914, from a boy, sixteen years of age. During treatment by another physician it was noted that there was a great deal of hemorrhage, and that the growths were rather solid. The conclusion was reached that the trouble was serious. Sections showed a myxofibroma. Sections made by the speaker were pronounced to be lymphangioma. The whole nose was filled with a great mass. X-ray pictures were taken, which were shown to the members. These pictures showed the antrum, nasal, postnasal and sphenomaxillary fossæ filled with the mass. When operating, Dr. Fletcher went into the antrum underneath the cheek. From there he took down the entire lateral nasal wall and took out the tumor mass from the nose. This caused terrific hemorrhage. Then he dissected toward the tumor protruding under the zygoma, and got out the smaller of two large masses. Another large mass was felt, which he loosened all around, so that it was movable with the forceps. Traction would not bring it because it proved to be attached to a large mass in the postnasal space. He then loosened the latter from its attachments, which were broad, and removed it with a No. 8 wire snare, releasing thus the mass in the sphenomaxillary fossa. Having also curetted out the antrum, he supposed he had all of the tumor out. Three weeks afterwards he found another mass occupying the sphenoid. He could go three-fourths of the way around it, as though it grew upward from the floor. With a curved knife he liberated the mass and got it out. This mass was about the size of the end of his thumb. He presumed that it had broken down the wall. On looking

into the nose now, after healing, he could see that a mass protruded, and that it is a peculiar lip of bone, which is the floor of the sphenoid. It seemed to have developed between the postnasal and the sphenoid in the masses. It certainly was a rather peculiar formation of the bone. The large masses have not been sectioned, as yet, but will be done soon. It may be malignant, but that question will be settled in the near future. The speaker hoped to refer to the case at a later meeting and give the result of such examination.

Demonstration of a New Hearing Tube.

DR. ROBERT SONNENSCHEIN demonstrated a hearing tube which appeared to be very satisfactory. There are a number of such tubes on the market, of woven material over wire coils, but these are very large. There is also in this country one metal hearing tube, which is, however, much larger than the one he presented, and does not transmit sound quite so well. The speaker's attention was called to the tube he showed by a patient who has a very marked otosclerosis, in which the nerve is markedly affected. This patient is selling this tube as a means of livelihood. Without the tube he does not hear whisper at all. With it he can hear the ordinary low tone very distinctly, and the ordinary conversational tone very loudly.

The advantages of the tube are: First, it is made of oxidized copper and does not corrode. Second, both ends are detachable and can be boiled. Third, the tube is so small that it can be carried very easily. It is flexible. So far as the speaker knows, it has only one disadvantage, namely, its cost. It is an English product and somewhat expensive. The majority of tubes cost about five dollars, but this one will be ten dollars, less twenty-five per cent to physicians. If the latter is willing to forego a commission, the patient can have it for $7.50. The tube appealed to Dr. Sonnenschein because even the very slightest whisper, spoken in the midst of a noisy room, can be very easily heard by the patient above referred to when using it.

Paper: The Inferior Turbinate.*

By John A. Cavanaugh, M. D.,

Chicago.

DISCUSSION.

Dr. J. C. Beck wanted to speak from the standpoint of the pathologic changes that are found in inferior turbinates. He thought Dr. Cavanaugh had not covered the subject from that standpoint sufficiently. He had hoped that after Dr. Cavanaugh made a study of the specimens of Dr. Beck's he would save the discussion on that point. He presented forty-two histologic specimens of inferior turbinates, which represented ten different pathologic types. There are not three, as Dr. Cavanaugh stated, but ten, and they play an important part in the therapeutics, particularly as to the result of operation. First, there is the turgescent type, in which the vessels are dilated, the venous channels are distended, and not much reactive inflammation—just that inflammation which would result from congestion. Second, the later effect of that condition, namely, inflammatory, from the result of the irritation of this large turbinated body, and in this we find not only the inflammatory condition in the wound cells, but, third, increase in the epithelium, so that we have a change in the epithelial structure almost like a hornification, a folding in of the masses of epithelium. Then, fourth, you will find a changed condition in the inferior turbinated body, in the bone proper—that is, the bone is hypertrophied—an actual osteitis. Fifth, there are conditions secondary to systemic conditions, which Kyle, of Philadelphia, has especially called attention to, the cyanotic inferior turbinates, secondary to cardiac disease, in which we find a chronic edema in the inferior turbinated body. That is a true pathologic condition in the turbinate, but secondary, the same as anasarca in any other part of the body. Sixth, is the socalled "mulberry enlargement," which Dr. Cavanaugh left out entirely in his paper. These changes we are all accustomed to find in the large posterior ends of the turbinate, which hang into the postnasal space, so to speak, or against the eustachian

*See page 621.

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tube. Siebenmann has shown that hypertrophy of the posterior end is really an atrophy, and has called attention to the fact that the distribution of the glands in the inferior turbinate body furnished no glands in the lower end, and to that point Dr. Cavanaugh did not call attention. Therefore, if the lower end of the inferior turbinate has no glandular tissue, the cautery in that region does not attack any physiologic structure.

The seventh form of pathologic change is atrophy, which is of various forms; for instance, as found in genuine ozena, in which the epithelium is in a metaplastic form, with shrinkage of all the other components of the turbinate, or secondary shrinkage and substitution by scar tissue, as following or associated with chronic suppurative sinus disease, or following or associated with luetic ozena. The eighth form is the primary tuberculosis of the inferior turbinate, which is characterized by chronic inflammatory changes and the pathognomonic findings of the giant cells, etc. Dr. Beck reported a case like it in *The Laryngoscope* several years ago. It is also found in Ballenger's textbook.

The ninth variety of pathologic change is the sarcoma or carcinoma, which is very well recognized from the characteristic histologic findings.

Finally, the tenth type is the miscellaneous, such as other forms of neoplasms and inflammation, as, for instance, angioma, fibroma, myxoma, chondroma, actinomycosis, rhinoscleroma, etc. All these have their characteristic histologic change. Dr. Beck has specimens of most of these conditions, and would be glad to demonstrate the sections.

Regarding cautery, this has been very interesting to Dr. Beck in the study of the results of cauterization compared with a cutting operation. Then, also, the connection of the pathologic change in the turbinate when the various treatments were applied, such as cauterization, etc. For instance, those turbinates which he found had a great deal of epithelium gave practically no result; in fact, they were made worse by cauterization. There was increase in the epithelial growth and increase in the swelling of the turbinate following linear cauterization. Whereas, in those cases in which the punctures were made the results were very good. In bony hyper-

trophy only the removal of some of the bone will give good results.

It is the speaker's belief that the operation described by Dr. Cavanaugh, and as recommended by Yankauer and Freer, is a case of "much ado about nothing," and not worth the trouble. He has been practicing the following: If the lower edge of the inferior turbinate and posterior end are large, they are removed by snare and the lower edge of the mucous membrane is turned up, part of the bone removed, so that the mucous membrane will cover the bone when brought down again. Where the enlargement is not so great he has been satisfied with a process he calls the crushing of the lower edge of the turbinate, not producing necrosis, but a necrobiosis. The instrument used will be described in the next number of the ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY. This procedure has positively been absolutely satisfactory in his hands, in showing the gradual reduction of the lower edge of the turbinate by this method of crushing of the turbinate. It is a slow death, so to speak, of that tissue which is not functionating. In conclusion, the speaker thought the society was indebted to Dr. Cavanaugh for his timely paper.

DR. ROBERT SONNENSCHEIN wanted to refer to two points. First, with reference to the submucous electrolysis mentioned by Dr. Cavanaugh. The speaker referred to a method that Dr. Pierce used, in which he simply made a small incision at the anterior end of the inferior turbinate, and then introduced a probe along the bone, thereby setting up an inflammatory reaction in the latter, which is the object of the electrolysis, but in this case there is no destruction of tissue, less reaction, and almost as good results as those claimed by those who practice submucous electrolysis.

Second, with regard to carbon dioxid snow, which seems to give good results for the time being, it is very easily applied, except that it is necessary to have an experienced operator. He had seen Dr. Gradle operate on one or two cases, and had examined the patients two months later, and they showed good results, but he could not say anything as to the permanent effect.

DR. H. W. LOEB, of St. Louis, was interested in the paper from two standpoints particularly, the anatomic presentation and the therapeutic. Dr. Cavanaugh mentioned some figures

as to the length of the turbinate and the distance from the turbinate to other structures. The speaker would like to ask if these measurements were taken in fresh heads or preserved heads, and if taken simply with calipers or reconstructed. The error will be tremendous unless they are reconstructed, and unless one admits that the distances in the living are not at all like those found after death, because the changes that take place under the methods of preservation make a decided difference in the thickness of the mucous membrane and distances between various structures. Since the development of the submucous resection, the speaker's opinion, from his own practice, is that the inferior turbinate comes very little into play by way of treatment, whereas formerly much unnecessary operative procedure had been employed. Now he seldom finds any call for inferior turbinate work. He is inclined to agree with Dr. Beck that when one has a posterior turbinal hypertrophy, or hypertrophic condition, or cystic condition, in the posterior portion of the turbinate, there is no use doing anything except to remove it. It will never return to normal function. Most of the speaker's cases requiring operation on the posterior turbinate are those in which there has been a redundancy of the mucous membrane lying on the floor of the nose, and he simply cuts it off and pays no more attention to it. He does not adopt the refined method of Yankauer or Freer, or the somewhat angiotribe-like method of Dr. Beck.

Dr. Charles M. Robertson said that the posterior end of the turbinate is, of course, the offending member in almost all of these cases, and there are cases that come to the notice of rhinologists in which the lumen of the nose is encroached upon by the inferior turbinate, whether it be hypertrophy or vasomotor turgescence that causes it. He has been practicing rhinology long enough to have been through all of the fads, and he has bored holes under the turbinate and through the turbinate and punctured the turbinate with galvanocautery and with chromic acid, and so forth, as all the rest of the older men have. He has gone through all stages of cautery, both from above and below, and as he gets a little bit older he gets a little more conservative about the use of the knife. He has found that very many of these cases of so-called turgescence are general conditions. He has at the pres-

ent time a very typical case of this character under his care, on whom he was threatening to operate. However, he prescribed a liver stimulant and got rid of some bile that was manifesting itself through the system, with reduction of the turbinate, and the resumption of normal physiologic action. He thinks we ought to keep that in mind, and not deal with these conditions surgically until we have treated the case as a physician should.

As regards the surgical treatment of the turbinate, he is agreed with Dr. Beck. When there is a hypertrophy of the bone, when there is too large a dilatation of the venous sinus, he takes off the lower edge of the inferior turbinate and sacrifices the posterior end. The speaker went through the Yankauer period, and this operation was very unsatisfactory and unnecessary in his hands. He has had cases repeatedly come back to him in which he had to ask which side he had operated upon, because the turbinate looked just as round and nice as the other.

He was astonished that Dr. Cavanaugh did not bring up that old scare about scabbing, which used to be the thing so much talked about, after taking off this large amount of tissue. We always heard a lot of scab formation on the operated area. The speaker has seen scabbing in the clinic once in a great while after an operation on the turbinates, but it was always after somebody had operated who had haggled the tissue on the edge of the turbinate and not cut it smooth. If we cut off the lower edge of the turbinate, which is devoid of venous sinus and glands, the part becomes depleted and the mucous membrane falls down and forms a V, the little pieces of mucous membrane coalesce, so that after twenty-four or forty-eight hours the mucous membranes are in apposition, and you do not have to take out any stitches or wait for them to heal. In case of the patient being a bleeder, it might be necessary to adjust the edges of the little flaps and coapt them. This can be done, if you wish, by a galvanocautery, or it can be done by black silk sutures, or by putting a little pack in. As we get a little older, he is sure the technic will become simpler.

DR. CAVANAUGH, in closing the discussion, said he expected what he got, and a whole lot more, but appreciated what all the members said and was sorry that there was not more dis-

cussion. The pathologic side was briefly mentioned because he was not prepared to present the subject from a histologic standpoint.

In reference to Dr. Sonnenschein's remarks about the use of the probe along the periosteum, Dr. Cavanaugh has not had any experience, but did not think it would do the work in most of these cases. If there is a true hypertrophy, there would not be much contraction; and in turgescent cases, the vessels being dilated, he could not see how the operation spoken of would take care of it. Still it might.

Answering Dr. Loeb's question about measurements, those of the bony turbinates were taken in the cadavers, while the measurements with the mucous membrane were taken in the living subjects, some after shrinkage, and some before, but all the measurements mentioned in the paper were taken without shrinking.

Dr. Robertson's remarks might be timely to the younger men, but the speaker may lay claim to a few gray hairs (laughter). He has not had Dr. Robertson's experience, yet believes one could not say whether or not these turbinates were functionating by their macroscopic appearance. Dr. Robertson can tell whether these turbinates are normal only by microscopic specimens, as they show the actual changes in the turbinates, and Dr. Cavanaugh thinks that is what has to be done in all these specimens to get a foundation. It is very easy to look into a nose and see what we might call a nice turbinate, from a macroscopic appearance, but when it comes to the true functionating part of that turbinate, the speaker believes a specimen should always be removed and microscopic sections made, in order to prove the point.

Paper: Local Versus General Anesthesia in Nose and Throat Operations.

By Joseph C. Beck, M. D,.

Chicago.

DISCUSSION.

Dr. George E. Shambaugh believes that the question of an anesthesia, both local and general, is a much more impor-

*See page 597.

tant feature of operation than it is usually given credit for; especially is this true for those doing nose and throat work. First, as regards general anesthesia. It is more difficult to administer this properly for an operation about the nose or throat than for operations on the ear or elsewhere. The method usually employed of having the hospital interne give the anesthesia is open to serious objections at times; this is especially true during the period when a green interne is learning how to give an anesthesia. For this reason Dr. Shambaugh advocates strongly the employment of a trained anesthetist, especially for the removal of tonsils and adenoids, or other operations about the nose and throat. He has followed this method for several years, and would not think of going back to the old method of having to take chances with a green interne giving the anesthesia. An expert anesthetist soon learns just how deep an anesthesia to give in order to get the patient in the best condition for the operator, and does this even with children, usually without the slightest fright to the child.

At the Presbyterian Hospital they find it unnecessary to resort to any special method of giving the anesthesia. The simple drop method is employed until the child is thoroughly under. The patient is then turned over on the side, the operator sitting down in a chair. No special provision is necessary here for continuing the anesthesia, or for taking care of the bleeding, since the blood runs naturally out of the mouth and is not inhaled. If the reflexes return before the operation is completed, the cone is again replaced over the face and ether is given for a short period. As a rule, no additional anesthesia is required for a tonsil operation.

All special apparatus for administering anesthesia or for pumping blood out of the throat is adding so many more things to get out of order and to complicate the operation. The operator who has had experience gets along with very few instruments, and the same is true of a trained anesthetist. In some places the expert anesthetist seems to have had a mania for devising elaborate and unnecessary instruments for doing something which is very simply and just as efficiently done without them.

The danger of inhaling blood during the tonsil operation is when the patient is on his back. It is not without risk.

The speaker knows of two cases occurring in Chicago last year, where lung abscess developed from this cause. This danger can be entirely obviated by placing the patient on the side, as already described.

As regards local anesthesia for tonsil work, Dr. Shambaugh finds that he succeeds much better now than he did a few years ago. A great deal depends upon the technic. He never uses stronger than five per cent cocain rubbed on the surface, and injects one-half per cent novocain. Injections are made at three points only for each tonsil: the posterior pillar, at the lower pole of the tonsil, and into the capsule; the latter is accomplished by pushing the needle through the soft palate. He finds it exceptional for a patient to experience pain during this operation. He does have cases, however, where it is impossible to get complete local anesthesia. This is always the case where there have been dense cicatricial formations complicating the peritonsillar abscess, but it may also occur in the simpler cases. He has found that wherever the application of five per cent cocain and adrenalin results in a local anemia a satisfactory anesthesia is assured, and it is only in cases where the application of this solution seems to bring on a local congestion that he has experienced any trouble in getting a proper effect.

For the operations in the nose he has discarded entirely the stronger cocain solution and uses the five per cent made up in adrenalin. He has found that he gets just as complete anesthesia with five per cent as with a twenty per cent.

Dr. D. T. Vail, of Cincinnati, by invitation, said that he had nothing but words of admiration for Dr. Beck's paper. He was, however, in harmony with Dr. Shambaugh in his remarks pertaining to professional anesthetists bringing complicated anesthetic apparatuses to the operating room, taking up valuable space and detracting from the operation by constantly calling the attention of the operator and others present to the splendid demonstration as to his ability to give mixed anesthesia and have the patient come through alive. Offhand, he recalled two deaths from anesthesia in his own experience, both occurring in cases of similar nature. In each case there was a tumor involving the antrum of Highmore, which extended into the sphenoid cavity. As it was very important to have the patients properly anesthetized, he employed ex-

pert anesthetists in each case, who brought to the operating room a complicated apparatus which required as much skill in manipulating as a pipe organ. In one case the patient died three days after the operation, never having come out of the condition of shock, rapid, thready pulse, cyanotic expression, etc.; in fact, the heart whipped itself out. In the other case the patient, a little boy of twelve, was deluged with a mixture of all kinds of anesthetic gases from an elaborate apparatus, and he died on the table. Since these experiences the speaker is satisfied to use the Esmarch mask and have the ether poured on drop by drop, watching the patient go through the various stages of anesthesia to complete narcosis.

Dr. J. R. Fletcher uses both general and local anesthetics. The drop method and various devices are unsatisfactory. While we should not work against time, as formerly, both tonsils can be removed and bleeding points tied in a few minutes under continuous deep anesthesia. He has seen five deaths from anesthetics, for but one of which he must answer. This patient died after cocain-adrenalin injection, as he always does it, using about one-fifth grain to the patient. The question remains, What caused his death? The speaker has continued to use the same solution, namely, cocain, one grain; adrenalin, twenty minims; normal salt solution, eighty minims, for years, even in small children, without bad effect. When the above injection is made in blisters around the tonsil, either with or without general anesthesia, no suction is necessary, as the amount of hemorrhage is very small.

Dr. Ira Frank said that to those doing the Killian suspension this method is far superior to any he has tried. He has not the elaborate apparatus exhibited, but still a very satisfactory one, with the foot pump. There is only one precaution he would like to mention, namely, not to pump too fast, because the patients get a direct inhalation of the ether. A few days before, he had been able to do a complete suspension, demonstrate the larynx to those present, and take out both tonsils and adenoids, and the child was still asleep.

Dr. H. Kahn wished to refer to the postoperative acidosis and acetonuria which follow carbohydrate starvation and are due to changes in the liver. The use of sodium bicarbonat is not satisfactory. The use of sugar, however, is. He has

had quite a good deal of experience in postoperative acidosis, and has found that the use of four per cent glucose injected into the rectum, either before or following operation, is more effective than the use of sodium bicarbonat. The latter has practically no effect, in his opinion. It may have some, but not nearly so much as the sugar. If in those cases that seem likely to have an acidosis—ill nourished children and people who are afraid—you will feed them candy or sugar some time before operation, you will have better results. The speaker believes the acidosis is due to starvation, and, therefore, changes in the liver. If you feed them candy and fill up the liver with sugar you will have less acidosis, and the sugar is an effective agent rather than the sodium bicarbonat.

Dr. H. W. Loeb, of St. Louis, said that one phase of the subject had not been considered at any length by those taking part in the discussion. This was with reference to increasing the number of cases in which general anesthesia is administered. Dr. Beck had mentioned very casually about his growing tendency to use a general anesthetic for submucous resections, and things of that sort, referring to the fact that some men were able to do these under local without pain, by virtue of their hypnotic powers, and so forth. Dr. Beck's contention, of course, is that these patients have some neurotic result. The speaker thought that the neurotic results from using a local anesthetic come primarily from other neurotic conditions. He cannot see why anybody wishes to use a general anesthetic for a submucous resection. The speaker's patients complain of only one thing, namely, the removal of the packing after operation. To carry out Dr. Beck's idea one should give an anesthetic at that time also, unless by his hypnotic influence he can remove such packing without pain.

Another thing, namely, Dr. Beck's plan of following out the anoci association of Dr. Crile. He should carry out the other suggestions of Dr. Crile, to the end that the patients never know when they take the anesthetic. Of course, this refers more particularly to goiter operations. The patients are visited by the anesthetist day after day for a number of days; have perfumes tried on them, and a little perfume and ether, and so forth, until on the day of operation it is given without their knowing it. If we are to get the full value of

anoci association, we should not only block off everything, but also the impressions which the administration of the anesthetic causes.

Dr. Robert Sonnenschein wished to suggest one thing in reference to the patient referred to by Dr. Fletcher, who died under local anesthesia for tonsillectomy, and that is, if he heard aright, that twenty minims of adrenalin were used. Freudenthal, of New York, showed in an article a few years ago that adrenalin when used in quantities more than about ten minims of a 1/1000 solution has caused death in a number of cases, where it alone was used; therefore, eliminating the fact of the cocain. He showed conclusively that a great many of these cases of sudden death during local anesthesia were typical adrenalin deaths, with very marked pallor, small thready pulse, and death in a few moments. He warned strongly against the submucous injection of large quantities of adrenalin. It seemed to the speaker that in using the Schleich method it is not necessary to use the adrenalin, because the mere injection of salt solution will give a very marked anesthesia when adrenalin is omitted.

As to the removal of the packs, if the famous Beck paste is applied on splints, such as the cotton nasal splints, on both sides at the time they are inserted, it is usually very easy to remove them on the following day.

Dr. J. R. Fletcher said, in answer to Dr. Sonnenschein, that the whole formula called for twenty minims; only fifteen minims of that were used—namely, a dose of 20/100.

Dr. Sonnenschein accepted the correction, but thought the point mentioned as brought out by Freudenthal was an interesting one.

Dr. R. H. Good said he had had two very interesting cases lately, of which he would like to speak. The first was a young boy of fourteen, in whom he did an operation on the middle turbinate. There was some hemorrhage, which, however, stopped in a minute or two. Then he proceeded to remove the tonsils, first injecting novocain around the tonsils. In a minute or two after injection the boy began to complain of terrific headache and the nose began to bleed profusely, which the speaker thought would stop in a minute, but after five minutes he was obliged to pack in order to control it. He complained of such severe frontal headache that he had

to lie down, and it was impossible for the speaker to proceed with the operation for seven minutes. That was the first case of that kind he had had up to that time, but a week ago he had an adult in whom he injected novocain—a two per cent solution—and the same terrific headache appeared. He is satisfied that the novocain caused this headache.

It has always been said that we should wait for fifteen to twenty minutes for anesthesia after injecting novocain. The speaker does not find this the case. Immediately after injecting he begins to operate, and thinks the anesthesia is better.

He has been using the Brophy anesthesia outfit for at least twelve or thirteen years, and has had no trouble in keeping the patients asleep, providing the apparatus is used properly and in good repair.

Another important point about this method of anesthesia, namely, the tube that goes into the ether should have fifty or one hundred holes in the bottom of a ball-like enlarged end which is immersed in the ether, so that the air comes out of fifty or one hundred holes in small bubbles through the ether. In this way you can keep any patient asleep without a warm bath or motor. The speaker does not like the noise of a motor. Furthermore, you have a new interne every week or month, and with a warm bath and a motor the ether is escaping all the time, and you can easily put a patient to sleep too deeply with this method. The simpler the method used the better.

Another point. You could not hire the speaker to use cocain for submucous injections in tonsillectomies. He has had considerable experience with it, and would not use cocain subcutaneously for tonsils so long as we have novocain to substitute for it.

Regarding general anesthesia in adults for tonsillectomies, he gives it occasionally, when he has to, but keeps away from it whenever he can.

Dr. A. A. Hayden thought what Dr. Shambaugh said about the ischemia taking place, especially in tonsil cases, as being an index as to complete anesthesia, is very important. When the low percentage of adrenalin is used and the parts become pale, the anesthesia is always complete. When they do not become pale, it is not complete, in the speaker's opinion.

Regarding the apparatus presented by Dr. Beck, the speaker

wished to recommend it strongly. A few years ago he was prejudiced against all apparatus of this sort by seeing a very noted surgeon use an apparatus of his own, and it took him an hour or two to get out the tonsils. And so he was prejudiced against such methods until Dr. Bergeron introduced an apparatus of the kind shown by Dr. Beck into St. Joseph's Hospital. He persuaded the speaker to use it, and he found that it was not a contrivance that would make the operation longer, but, on the other hand, very much shorter, if properly used. So, the apparatus exhibited is very satisfactory, in his opinion.

Another interesting point is that the operator can pretty well tell the coagulation time of the patient's blood by what is in the bottle. If clotted at the end of the operation (saying the operation took five minutes), it is a very fair estimate that the coagulation time of the patient's blood is normal. If not, it is a fair estimate that the coagulation time of the patient is not normal, and that we should look more carefully to every hemorrhage.

Dr. George W. Boot said that for the last six years they have used a much simpler method than that of Dr. Beck in the Children's Memorial Hospital. In this method they use the old-fashioned paper cone, covered with a thin towel. There is a nurse who gives anesthetics and takes X-ray pictures. Using this apparatus, she will habitually put the children to sleep with two ounces of ether for tonsillectomy, and the operation is done in this way in from ten to fifteen minutes. The ether is given until the patient is far enough asleep to take out one tonsil. The inhaler is then put back while the snare is rearranged. By the time the wire is ready for the next tonsil the patient is far enough asleep for the second enucleation. That is done and the adenoids taken out without any further anesthesia. The ether does not have time to get fixed in the tissues. They have never had a death from the anesthesia since using this method.

With regard to the use of chloroform, he thinks there is only one class of cases in which its regular use is justified, and that is in alcoholics.

He would like to speak of another point, namely, doing mastoid operations under local anesthesia. He has done four such operations under local anesthesia. Two of these were

in children sick with scarlet fever. One was in a man who was far advanced in tuberculosis, and had chronic Bright's disease. The fourth was in a man who did not want to take ether. In all four the operation was done very well under local anesthesia, using novocain.

DR. BECK, in closing, said that he knew very few would agree with him, and he sincerely hopes that by the time the subject was presented again by someone else a good many would have changed their minds, because he honestly believes that if it were left to the patient whether he wanted to be operated under local or general anesthesia (if he had been operated before under ether), he would prefer being operated under general anesthesia.

In regard to the drop method of anesthesia, Dr. Fletcher answered that point—the patient is not asleep long enough. You cannot do good work unless you are a rapid operator, when you use the drop method of anesthesia.

Regarding deaths from anesthesia, the speaker recalled four, all when ether was employed. One of these occurred in Dr. Gradle's practice. The speaker operated on a brain abscess, and the patient died on the table. He was very low before and during the operation, and there is a question whether he died from the anesthesia or from the brain abscess.

The second case was one he had reported to this society four years ago, which occurred in a colored man who was operated on for meningitis. In this case it was discovered postmortem that the man had only one kidney, which was cystic, and the other was an infantile kidney. He had uremia, and so the anesthetic perhaps helped him along a little sooner.

In the third case the patient was operated for tonsils and adenoids, and the child died on the table while the assistants were operating. Dr. Le Count made a postmortem examination, and an enormous thymus was found, a status thymicus. In trying to find the vessel for injecting adrenalin as a restorative measure, they could not find a large enough artery or vein to do so.

The fourth case was one which occurred in a case operated on out of town, and in this case he felt sure an overdose was responsible, namely, no attention was paid to the amount given, and the patient was simply drowned in the ether.

Dr. Fletcher had called attention to a death from a local anesthetic, and the speaker said he was looking at Dr. Loeb, to remind him that deaths had been reported before from local anesthesia. How about the cases that he (Loeb) operates under general anesthesia? Perhaps he meant to say he would not use general anesthesia unless he had to. That is only discussing a little point in a big question. Dr. Beck would say that the general anesthetic must be made as safe as possible, and a good anesthetist employed, upon whom you can rely, and then you need not fear death from ether anesthesia. So, after all, it is not the question of finding objections to the general anesthetic, but the manner in which the anesthetic is administered.

Dr. Kahn spoke of glucose instead of bicarbonat of soda. Dr. Beck only knows that since using the bicarbonat of soda, whether scientifically proven or not, it has seemed of value. He could only take Dr. Lynch's word for it, from his experience. Dr. Lynch lost his own child from acetonuria following an operation, and went into the subject carefully, having made experiments, and he thinks that bicarbonat of soda is of value to prevent the acetonemia. It is used in diabetic cases where general anesthesia is employed. The glucose may be better. The speaker would like to think it over.

In answer to those who spoke of the apparatus exhibited as elaborate, he would state that a great deal of comfort is attained by operating with the patient asleep, with no blood in the throat and mouth, not covered with a mask, which is worth all the elaborateness of the apparatus.

In regard to the removal of packing being painful, he would quote Dr. E. Fletcher Ingals in giving an anesthetic to remove nasal packing. He had reported that to this society some two years ago. The speaker, however, has never done this.

Regarding anoci association, the speaker uses it, but not with perfume. There is no speaking allowed in the room while the patient is being anesthetized.

Regarding the motor in the apparatus exhibited, and the noise it makes, Dr. Good's objection to it is perfectly correct. The speaker thought also that the foot bellows would be better, but the foot pump is constantly getting out of order, and so he had done away with it. He thinks the method of giv-

ing the anesthetic with this apparatus is simpler and easier than with a foot-pump, and so he uses the motor attachment.

Dr. Sonnenschein spoke of death from the use of adrenalin. The speaker two years ago reported on the use of adrenalin in otosclerosis. He has used it since then, as high as fifteen minims every other day, and has seen nothing but the symptoms that result from adrenalin. Those of the members who knew Hansen's experiments on adrenalin would know that fifteen minims are not toxic. He did not think that death in Dr. Fletcher's case was due to the adrenalin.

Futterhoff, of Philadelphia, has reported one death from sudden shock due to distention at the mucocutaneous junction, in connection with the submucous operation. Dr. Stubbs reported on this very fact at one of the meetings of the society several years ago.

Regarding the point brought up by Dr. Hayden as to blood clotting, the coagulation time is determined as nearly as possible before operation.

Regarding chloroform, the speaker had said in his paper that he would use it in infants. There is quite a call for it in such cases, but not in older children or adults.

In conclusion, he would like to recall the statistics given by Rovsing three years ago to the American Medical Association, in which he stated that fifty thousand ether anesthesias were collected without a death; twenty-seven thousand chloroform, nitrous oxid and other forms of anesthesia with sixteen deaths.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, Held March 16, 1915.

DR. GEORGE W. BOOT, PRESIDENT, IN THE CHAIR.

Anomalous Condition of Middle Ear, With Pulsation of Lower Half of Membrana Tympani and Distal End of the Floor of the Auditory Canal.

DR. OTTO J. STEIN saw this patient for the first time in November, 1914, about four months ago. At that time he gave a history of having been deaf in the left ear, the right ear being normal. At no time has there been a history of any discharge or pain. The only thing noticed was that the loss of hearing began rather gradually, accompanied by tinnitus and some vertigo. When first seen the drum was a little red, probably from manipulation incident to treatment. He had been under the care of some others prior to coming to the speaker. This redness gave the impression of an inflammation, but as that subsided one could see that the drum was very flaccid and thin, and apparently otherwise normal. There was no evidence of a scar. It lay well forward toward the floor and anterior wall of the canal, giving the impression as of something pushing it from behind outward and forward. When the otoscope was inserted firmly and compression made, this flaccid drum was driven back to its more normal position, and as the air reentered, allowing the drum to sink outward and forward, you could see the pulsation synchronous with the carotid. There was no hearing whatsoever in that ear, neither bone nor air conduction. Since being under observation he has a little bone conduction. His static apparatus is all right. He had a very faint rotary nystagmus on looking straight forward when twelve milliamperes of current were used. Otherwise negative. Responded to all tests.

Dr. Stein presented the case as a rather curious anatomic anomaly. He did not know the exact pathology. On compression of the carotid in the neck with the finger the patient

said the tinnitus was markedly diminished. If pressed long and hard enough, it would disappear altogether.

The patient has remained in about the same condition as when first seen, four months ago, and at that time he had had the trouble for six months.

DISCUSSION.

DR. OTIS H. MACLAY asked if the blood pressure is very high.

DR. STEIN said he did not know the blood pressure. He had some X-ray plates which are interesting, which he showed to the members.

DR. SHAMBAUGH asked if there was no discharge at any time. Also if there was perforation.

DR. STEIN replied that there was no discharge at any time. Also, there was no perforation, except that done traumatically. From examination of the X-ray pictures, it looked to him like a diverticulum off the sigmoid portion of the sinus; like an appendix coming off toward the floor of the canal.

Unusual Case of Vertical Nystagmus Caused by Labyrinthine Irritation.

DR. ALFRED LEWY exhibited this case. The man is forty-two years of age; married; gives a history of discharge from the ear in childhood, which has not troubled him since he was about ten years of age, but for the last year has been complaining of mild vertigo, coming on suddenly; particularly on sudden movements of the head or turning the eyes suddenly to either extreme. The patient admitted having syphilis about twenty years ago.

On examination the speaker found a large anterior marginal perforation in the left drum membrane, and both ears gave the usual findings of a marked conduction deafness, more marked in the ear with the perforated membrane. After rotation, nystagmus is thirty seconds to either side. On account of the perforation the speaker did not try the caloric test, and did not have any electric apparatus handy for the electric tests. He did find, however, that on compression of air in the left canal he had a marked vertical nystagmus, two or three jerks downward, and Dr. Lewy believed this to be

a very rare condition; in fact, some claim that there is no such thing as a vertical nystagmus from the labyrinth. It is very evident that this nystagmus is caused by labyrinthine irritation. The doctor, however, was not prepared to give any explanation for it. He hoped some of the members could offer an explanation of such a condition in the presence of a perforated drum membrane.

DISCUSSION.

DR. GEORGE E. SHAMBAUGH asked if he could get the reverse nysgtamus by suction.

DR. LEWY replied that the suction reaction was doubtful.

DR. J. R. FLETCHER believed there was a fistula present in the case, but unless the eyes move in opposite directions by compression in one and suction in the other, it is not demonstrated. At least, that was the law laid down by Bárány, and seemed to the speaker to be correct. You can have the reasonable probability with movement in one direction, but no proof.

The speaker has produced a nystagmus by direct pressure, which would move the stapes inward, and that might be the case in the patient presented. He remembered indistinctly a case he saw a good many years ago of vertical nystagmus, and his impression was very strong that this man had a fistula in the oval window, and a vertical nystagmus was produced by pressure. There was no nystagmus by suction. It was tried then to see whether the same thing could be produced on a perfectly normal individual, and one of the doctors present volunteered for that purpose, and with strong pressure a nystagmus in one direction could be produced.

DR. GEORGE E. SHAMBAUGH said that he was not inclined to exclude the existence of a fistula where one is able to produce a nystagmus in one direction by pressure, but fails to get the reverse nystagmus by suction. One can easily imagine the development of pathologic conditions about the opening of the fistula which would permit a motion of the endolymph being caused either by suction or pressure, but not by both. One also gets a fistula symptom in cases where no fistula exists. He has been able to develop this symptom by the inflation of the middle ear in cases where there had never been a sup-

purative disease. The nystagmus which occurs in fistula cases is in the plane of the canal which is involved. For this reason it is not easy to figure out how a vertical nystagmus can be caused. The horizontal and the superior canals are the two which encroach upon the middle ear spaces, and in which fistula can develop from suppurative otitis media. Possibly a fistula into the vestibule, associated with inflammatory deposits in the labyrinth, might result in producing endolymph currents by pressure which could so affect two of the canals as to produce vertical nystagmus.

DR. LEWY, in closing the discussion, did not see why we must assume that the nystagmus is necessarily the result of a lesion in one of the canals. It is possible that the general compression of the endolymph through the pressure produced on the round window and oval window through the external canal may in some way affect the end organ in the saccule or utricle, and in that way cause a nystagmus; but as to whether a fistula was the cause of the nystagmus, the speaker could not say. His principal reason for presenting the case was that it was only recently that he read a statement in a laryngologic journal that there was no such thing as vertical nystagmus resulting from a lesion of the labyrinth, and it is very evident in the case presented that this nystagmus is induced by irritation of the labyrinth.

Exhibition of Three Patients Operated on by the "Standard Tonsillectomy", to be Described Later in Dr. Fletcher's Paper.

DR. J. R. FLETCHER said that he had shown these patients to quite a number of the gentlemen present. His purpose in bringing them was to show that one can get by dissection, called the "standard tonsillectomy," uniform results, which seem to the speaker to be desirable—namely, rudimentary tonsillar fossa and a minimum scar. The first case was operated on four years ago, the second case one and one-half years ago, and the third one just one week ago. The results in the two which had healed are almost identical, and he knows from former experience that the same result will obtain in the third case. As the paper would show, the speaker believes there is a reason for such uniform results.

Specimen of Right Frontal Sinus Which Extended Downward, Seeming to Separate the Crista, and Extending Into the Perpendicular Plate of the Ethmoid—Exhibition of X-Ray Picture of Case.

DR. L. W. DEAN, Iowa City, Iowa, said this specimen had been discovered in working out a series of anomalous frontal sinuses. In this specimen the right frontal sinus extended downward, seemed to separate the crista, and extended into the perpendicular plate of the ethmoid. The X-ray showed this sinus descending into the bone of the septum.

DISCUSSION.

DR. GEORGE E. SHAMBAUGH stated that he had in his collection a specimen somewhat similar to the one shown by Dr. Dean. In his specimen the frontal sinus on one side had a prolongation down into the nasal bone, but no opening into the nose. There was a large defect in the septum separating the sinuses, and the drainage was through the opposite frontal sinus. It is not easy to see how a sinus of this sort develops. The frontal sinus is an outgrowth from the middle meatus. It seems probable that the opening in the nose had become closed by pathologic conditions, and the artificial opening had been made through the septum into the opposite sinus.

Paper: Cases of Lateral Sinus Thrombosis.*

BY GEORGE W. BOOT, M. D.,

CHICAGO.

DISCUSSION.

DR. ROBERT SONNENSCHEIN said, apropos of the difficulty of recognizing the presence of sinus thrombosis, he wanted to briefly report a case in which Dr. Boot had kindly assisted him. The man was about thirty years of age, and was admitted to the County Hospital the Thursday of the previous week with a history of discharge from the ear for the past month. There was no history of chill or high temperature. Temperature on admission was 99°. There was some tender-

*See page 554.

ness over the mastoid, and profuse, thick, purulent discharge from the ear. The next day (Friday) a simple mastoid was done—the antrum found rather high, and apparently all necrotic bone removed. The patient, however, did not recover consciousness. Temperature on the day of operation was 101°, and on Saturday, the day following operation, it went up to 103° at noon. He was reoperated and the sinus uncovered, it being necessary to go through solid, apparently healthy bone to reach the sinus. It was found filled with pus and a clot. The patient was moribund when placed on the table, and died shortly after the sinus was exposed. In this case there was absolutely no history of chill and high temperature until an hour or two before the last operation. The leucocyte count on the day of operation was twenty-five thousand.

DR. BOOT said that he had hoped the members would discuss the diagnosis and treatment of sinus thrombosis, especially with reference to the point of whether to ligate the jugular or not.

DR. GEORGE E. SHAMBAUGH said he thought sinus thrombosis is the most frequent serious complication that occurs in acute suppurative otitis media. The typical symptoms when the sinus is the seat of absorption are so characteristic that they can scarcely be mistaken. The high temperature, the sudden drop to subnormal, a sudden chill, and a recurrence of the same fluctuation in temperature. Not all the cases presenting these classical symptoms require the same treatment. These symptoms occur apparently from an involvement of the veins leading from the mastoid to the sinus, and where there is no actual thrombosis of the sinus itself. Dr. Shambaugh has several times operated and exposed the sinus in the presence of the characteristic fluctuations in temperature only to find no evidences of a thrombosis, with a droplet of pus apparently in contact with the sinus wall. Such cases usually recover promptly simply on removal of the condition in the mastoid.

The question of what should be done when the sinus is found to be thrombosed must be decided differently in different cases. Where there is no evidence of a softening of the thrombus, a free opening of the sinus, with perhaps a

partial removal of the thrombus, is very often better than an attempt to get bleeding from both ends. In cases where there is a suppurating thrombus, an effort should be made to remove as much as possible of the infected thrombus. Before this is undertaken the internal jugular should first be ligated.

Dr. Norval H. Pierce said a practical point was raised by Dr. Boot's paper, namely, the question of waiting. There are certain operators who, given a chill and a sudden rise in temperature, accompanied by a high leucocyte count and a running ear, will immediately operate on a sinus, open the sinus, and ligate the jugular. After a long experience he has come to the conclusion that that is a mistake. He does not think we should rush suddenly into any of these cases. He does not think that the patient's life is particularly endangered by waiting, by introducing the element of very careful observation before we go into these cases. He has had several experiences such as those cited by Dr. Boot, where, in the course of an otitis media—suppurative—the patient has had a chill and high elevation of temperature, accompanied by a high leucocyte count. In the course of a few hours or the next day an erysipelas developed, and there are other things that may happen in the body that will give this same picture, such as pneumonia, malaria, etc.

Now, if the infection is so virulent in a lateral sinus that it is going to carry the patient off in a few days, the operation is hardly going to help the patient—not even ligating the jugular and scraping out the clot. It will in all probability spread up the petrosal sinuses or back toward the posterior portion of the skull from the lateral sinus, or become distributed throughout the body. From a practical standpoint, therefore, he thought we should be impressed with the fact that we should observe a period of careful investigation after the onset of the initial symptoms of sinus thrombosis before operating. The length of time that period should occupy depends on the individual case. But once the diagnosis is made of a sinus thrombosis, his experience has taught him that we can scarcely be too radical. He has tried the method of slitting up the sinus and allowing the thrombus to remain in situ, simply packing it open, but has been rather disappointed in this method. He believes an endeavor should be made to get a hemorrhage from

both ends of the wound, and failing hemorrhage from the lower portion, we should not only ligate the jugular, but we should dissect it out from above the facial to as near as possible to the clavicle.

Another practical point is the relationship of leucocytosis. He did not wish to contradict himself by saying that he places great reliance in a high leucocyte count. He has scarcely ever been disappointed in accounting for a high leucocyte count by the finding of, if not an actual thrombosis of the sinus, at least a suppurating focus in contact with the osseous or membranous portion of the sinus somewhere in its course. Therefore, he would say that a leucocyte count should be taken in all cases of mastoid trouble, where operation is performed; and if a very high leucocyte count is found, we should be very careful to explore very much more thoroughly than we would if we did not find such a high leucocyte count before operation.

DR. KAHN asked Dr. Pierce what he thought about blood cultures.

DR. PIERCE replied that he did not believe they amounted to very much as a pathognomonic sign of sinus thrombosis. The work of Duel and others in New York is so contradictory that he does not believe much dependence can be placed on the findings of bacteria in the blood as a sign of sinus thrombosis. In his own work, which has been very limited in that regard, because after reading the work above referred to he came to the conclusion that it was not dependable, he has found bacteria in the blood where there could not possibly have been any sinus thrombosis whatever. Therefore, he would say that the bacteremia is not an indication of sinus thrombosis.

DR. S. A. FRIEDBERG fully agreed with Dr. Pierce in regard to conservatism in these cases. However, he thinks there are times when we can be too conservative. He thinks too much reliance has been placed on blood findings, waiting for the high leucocytosis. A low leucocyte count does not exclude sinus infection by any means. Neither does a negative blood culture. His experience with blood cultures has been about fifty per cent positive. We know, too, that we may get a positive blood count from other infections—from a strepto-

coccic sore throat, for instance. A certain work carried out at the Durand Hospital for Infectious Diseases found that in almost all the case examined—he could not recall the exact number—cultures were made aerobically and anaerobically, and organisms were found in at least ninety per cent of the cases where quite careful culture work was done in conditions other than sinus infections. He recalled two cases seen recently of sinus thrombosis in which the infection extended to the meninges—cases in which there was no definite picture of sinus involvement, although suspicion of it was present at the time. In one of these cases there were chilly sensations—not regularly—perhaps not more than one in a week, a relatively low temperature, a leucopenia instead of leucocytosis, and a negative blood culture. The speaker wished to bring out one point in connection with suspected sinus infection: The mere fact that a sinus appears normal does not necessarily mean that there is nothing in the sinus. During the last few months he has seen two cases where a practically normal appearing sinus contained pus.

There is another class of cases we see in which the symptomatology of sinus thrombosis is simulated, and that is in severe types of scarlet fever. He has seen a number of these cases complicated with ear conditions, in which a mastoid operation was necessary. Good drainage was secured, but still the irregular type of fever and chills occurred, which warranted one in opening the sinus. In two of these cases he recalled definitely he was unable to find anything in the sinus. There was free bleeding above and below. There was the whole picture of sinus thrombosis, complicated with metastases in the lung and spleen, also joint involvement, and practically nothing in the sinus. This shows that it is not always easy to make the diagnosis in these cases, even in the presence of a typical sinus picture. It must be borne in mind that sinus thrombosis in any other part of the body of a large vein will give the same picture. He believes that if we wait too long, however, in these cases of suspected sinus thrombosis we are defeating our own ends. Personally, he does not care about going into the sinus unless he feels the indication is clear, but he feels that he has been a little bit too conservative in that respect.

Dr. L. W. Dean, Iowa City, said that eleven years ago, following a mastoidectomy, a patient developed a septic temperature with chills. Temperature was as high as 105½°. Sinus phlebitis was diagnosed and the sinus operated. It was found to be normal. The day following the operation on the sinus erysipelas developed. Fortunately there was no serious result. Since that time in his service the rule has been never to operate upon a sinus until erysipelas has been excluded. In many cases operation has been prevented by close adherence to this rule.

Dr. Robert H. Good said that in one of his cases there was never a discharge from the ear. On Christmas the patient had a cold and complained that she thought there was some disturbance with the ear, but that was all the complaint made. Three weeks later she went to the Chicago Polyclinic, and there was a swelling back of the ear at that time. The drum membrane and hearing were perfectly normal. She was treated for six weeks, at the end of which time she consulted the speaker, and he found a large swelling back of the ear. Hearing normal. Drum membrane normal. He decided to operate. As soon as he opened the mastoid there was pus escaping, which was pulsating, coming from the extradural space. There was a very extensive sinus thrombosis, so that he had to ligate the internal jugular. The point he wished to make was that there never was any discharge in this case. The pus discharged into the extradural space.

Dr. John A. Cavanaugh reported an interesting case of a simple mastoid, upon which he operated three weeks ago. For two days the patient's temperature was normal. The third day the interne phoned that the patient had gotten out of bed to go to the toilet and had fainted. When the doctor reached the hospital the patient's temperature was 102° and there was retention of urine, also a slight sensation of chilliness. He complained of the right side of his chest, which, on examination, showed a slight area of pneumonia. The following day the temperature shot up to 103.8°. Dr. Cavanaugh had one of his colleagues see the patient with him, and he said he thought the patient had a sinus thrombosis. A culture was made that revealed a pure pneumococcic infection, both in the discharge from the ear and from the mastoid process. A

blood culture was made, which was negative. Leucocytosis was present. The fifth day the temperature was 100°. For three days the temperature ranged from 99° to 100°. Then it mounted to 103.8°. The same colleague again saw the patient with Dr. Cavanaugh, and then believed it to be an epidural abscess, but there were no findings to indicate such a condition, and Dr. Cavanaugh still thought it advisable to wait for more positive symptoms to help in the diagnosis. Gradually the lung condition subsided and the temperature—for the last four days—has been normal. This case was reported to cooperate with the conservative views expressed by Dr. Pierce.

DR. BOOT, in closing the discussion, said, with regard to the cases where there was suspected sinus involvement, there seemed no reason why the sinus should not be exposed and examined. Exposure of the sinus does no particular harm in the course of the mastoid operation, but it seemed to him to be decidedly not the thing to do to expose a sinus which we believe is thrombosed and contains pus, and do nothing more than expose it. It certainly is not surgical to leave an abscess without opening it, if we think there is pus in it, and it is not good surgery to leave a sinus which contains pus without opening it.

He was thankful to Dr. Pierce for not criticising him more severely about the erysipelas case, because he talked this case over with Dr. Pierce before opening it. If he had taken his advice he probably would not have opened the sinus.

As to the question of waiting, he recalled a patient on whose mastoid he operated without exposing the sinus. The septic condition gradually increased and finally ended in death from pyemia. Postmortem disclosed abscesses in the spleen, lungs, walls of the intestines, and also in other places. This was a case where he believed, had the mastoid operation been done earlier, the general infection would not have occurred. There was no thrombus found in the lateral sinus at postmortem. Nevertheless, the speaker believed the metastases took place from the mastoid, and had the mastoid operation been done earlier the child might still be living.

The question of blood cultures is probably, as Dr. Friedberg said, not of any great value in more than half the cases.

The case referred to by Dr. Sonnenschein had been seen by Dr. Boot. The man had absolutely no symptoms on which a diagnosis of lateral sinus thrombosis could be made. He was simply profoundly toxic, and during the second operation Dr. Sonnenschein exposed the sinus and found it filled with pus.

The case reported in the paper, where the jugular vein was opened and found to be full of pus, was a case that should have been ligated earlier. In this case it was not ligated because the clot was found at the lower part of the incision. The vein was opened just above the clot, pus evacuated, and, fortunately, the patient recovered.

Paper: The Differential Diagnosis of Laryngeal Motor Paralysis.*

By Otto J. Stein, M. D.,

Chicago.

DISCUSSION.

Dr. Otis H. Maclay said he had been very much interested in the paper. He had a case some time ago in which the thyroid was enlarged, and which was about to be operated upon. In this case the enlarged thyroid was on the left side, with a hoarseness which had persisted for about three or four weeks. The findings showed a complete paralysis of the right side, which was the opposite side to the enlarged thyroid, with an overadduction of the left cord in its effort to overcome the lack of adduction of the right side. Here was a cross pressure paralysis that was very decided. Operation was performed, and in about two weeks there was practically normal speech. The operation was performed for the removal of the goiter on the left side. The voice cleared up, as above stated, in a very short time.

Dr. Charles H. Long had been very much interested in the paper. He reported the case of a man, apparently in good health, fifty years of age, with abductor paralysis of three months' standing, coming on very suddenly, with no apparent cause. The patient denied lues. A Wassermann test was twenty-five per cent positive. Intravenous injection of salvarsan three weeks ago. The aphonia is the same. He is taking sixty grains of potassium iodid daily.

*See page 669.

DR. STEIN, in closing the discussion, in reference to Dr. Maclay's case, said that if the cords had not been examined, as in his case, and the voice returned, one must not be misled in believing that the paralysis had been restored, because frequently the voice will return, of course, from a compensation of the opposite cord. That is a well known condition, which happens frequently after operations for goiter, where even the nerve is injured, and the paralysis, due simply to an injury or pulling or edema around the nerve, finally dispelling. Even if the cord does not return to its perfect function, the opposite cord eventually meets the paralyzed cord, and the patient has a very satisfactory voice. In Dr. Maclay's case the speaker could conceive of such a paralysis being due to a transmitted pressure, such as we have in some aneurisms. Removing the goiter in this case relieved the pressure from the opposite side.

As to Dr. Long's case, the speaker would like to inquire as to whether an X-ray picture was taken.

DR. LONG replied in the negative.

DR. STEIN looks upon many of these cases with a great deal of suspicion of aneurism. He finds that we can diagnose aneurism more often than any other class of medical men. Laryngologists should examine the larynx in all patients, as a routine measure. These patients come in for various symptoms—sometimes simply for diagnosis, sometimes for hoarseness—and the medical man has not made a diagnosis. In fact, internists admit that it is very difficult for them to make early diagnoses of aneurism of the arch. The laryngologists may make it before the internists, and the X-ray first of all. It shows very prettily in X-ray pictures, and in many of these cases you can confirm a diagnosis with such a picture.

Paper: A Discussion of the Standard Tonsillectomy.*

BY J. R. FLETCHER, M. D.,

CHICAGO.

DISCUSSION.

DR. NORVAL H. PIERCE said that his technic in tonsillectomy does not differ especially from that described by the author of

*See page 591.

the paper. He does not believe in any operation other than dissection. He thinks it is a surgical procedure, not depending on personal dexterity or trickery. It can be done by anyone who is at all used to operating in this region. As to time, we should take as much time as necessary. Safety first. He thinks there is less hemorrhage from careful dissection than from the other methods—from the one instrument methods. But after examining some of his patients a year or two after operation, he has been, frankly speaking, impressed with the fact that the resultant conditions were not altogether satisfactory. He has sent his patients away with a sense of entire satisfaction. At the time of operation he has examined the tonsil and has accounted for every particle of it. And then, a year or two after that, these patients come back with a large piece of tonsil occupying one or both fauces. He supposes this is occasionally due to the pulling up of lymphoid tissue into the scar from the base of the tongue. That was the only way in which he could account for it. At one time he thought it unnecessary to take away the lower pole completely. He has found that that is a mistake. The lower pole gives trouble. The tonsil should be removed completely. Up to the present time he is not sure whether he knows just how to prevent the drawing up of that lymphoid tissue into the scar after a while. He could exhibit a number of cases showing just as good results as in the patients of Dr. Fletcher. But he does not know what causes the failure to secure ideal results in a certain percentage of other cases. He wished Dr. Fletcher would tell him whether he really believes there is something that prevents in all cases this dragging up of lymphoid tissue in the scar. Incidentally, he would add that he has had occasion to examine patients operated on by specialists of the first class, and he has observed the same unsatisfactory conditions which he has occasionally observed in his own cases.

Dr. G. S. Mikkelson asked Dr. Fletcher how he got a linear scar with a circular incision without using sutures.

Dr. A. M. Corwin had been very much interested, in an anticipatory way, regarding what the standard operation was for tonsillectomy, because he does not know it. The standard operation for attack upon a tonsil that needs attacking for local lesion or for regional or systemic reasons is plain. That

standard operation is tonsillectomy—tonsillectomy with the capsule, in spite of the fact that there are a few adherents even of removal of the tonsil just inside the capsule. He admires the skill of the gentlemen who can do that. Whether that operation will ever become standard is more than doubtful.

A standard is not established in a day, or in a decade; furthermore, it is a movable quantity. What is standard today is on the shelf tomorrow. This is the case not only in laryngology, but in general surgery and in medicine. There are clear indications, we will say, for removal of the tonsils, and yet there are fifty-seven varieties of instrumentation and technic for their removal, and each of these varieties is delivering the goods, whether in a minute or in a half hour. They are fulfilling the indications that were laid down by the speaker.

Dr. Fletcher's cases show very good results. Dr. Pierce had well said that just such results are seen every day. We are all getting those results by the methods that we choose to follow. Who shall say that the use of the scissors, in one or more of its different forms, is not to be standard in a decade or two? The speaker did not know. He knows gentlemen in this city who do very skillful work with the scissors, work certainly not to be improved upon. One of the most skillful operators in this country he has seen use a knife, a pair of forceps and a snare, and he takes out both tonsils, one after another, in ten consecutive cases, taking a fraction of a minute for each case, taking the adenoids out, too, in the same time, and doing it with as great precision as any of us. The speaker did not care whether a man uses a straight knife or an angular knife, or whether he uses three or four knives or instruments in doing a tonsillectomy, or whether the technic of the individual operator runs to simplicity, the point is the same—deliver the goods.

Of course, the members knew very well that he is an ardent advocate of the Sluder method. There are many little technical points about the Sluder operation, and if you see a dozen Sluder men work you will find a dozen little different methods of technic, but the principles applied are all the same. And when one looks at the Sluder operation, and says that it is bunglesome, that it is merely a one instrument makeshift for

good work, a mechanical uncertainty, and that its manipulator works in the dark and takes off two or three layers of this, that or the other thing, one is not really discussing with intelligence, as the facts do not bear out such crude criticism, chiefly from those who have never tried it.

Time only will tell what the standard operation is. Dr. Corwin did not think Dr. Fletcher had made good in telling the society what the standard method of tonsillectomy is, because certainly the technic laid down in the paper is not standard, for it is not used by a majority of men in the country, men who claim to be skillful along this line. In order to make an operation "standard," the majority of men must adopt it. In the meantime, we will do the very best work we can with the different technics and different instruments.

Another point, with regard to hemorrhage. That is a matter that is greatly exaggerated, in Dr. Corwin's opinion. In a large number of tonsil operations, in both adults and children, he has never had to ligate an artery yet. He has never had to sew the pillars together or resort to any of those things that we lay down in textbooks as things to be resorted to. If you have bleeding in this region and will apply pressure with stypsis for a few moments, you will always control those cases, except in hemophiliacs. The speaker always operates in a hospital, unless proper facilities are available in the private home, and general anesthesia is employed. With properly applied stypsis he has a practically bloodless pharynx. The Corwin tonsil hemostats are invaluable when used in pairs in adult cases.

Dr. Fletcher, in closing the discussion, said that the standard that we recognize is a tonsillectomy. He also stated that we have not agreed upon a technic, and so he presented a technic for consideration. He did not mean to suggest for a moment that he could operate any better than a great many men, but being opposed to the Sluder method, it being a step backward, in his opinion, he so expressed himself. Being a one instrument affair, it seemed more clumsy to him. He did not mean to say that some operators by the Sluder method cannot acquire a great deal of skill, but he does not think the bulk of operators can. He has seen on the vaudeville stage a woman who wrote a very good hand, or foot, with her toes,

so that when we practice enough we can apply skill in a great many unusual ways. But one can acquire the skill to take out tonsils as they should be taken out with dissection. He had stated in the paper that he did not insist on his technic being followed, but offered it for discussion as opposed to the Sluder. He is not opposed to the gentlemen who follow Sluder, because he thinks they are just as earnest as others, but he thinks there is a more uniform way of taking out tonsils than can ever be acquired by any large number of men using the Sluder method. The latter traumatizes a great deal more and does not uniformly give as good a scar as dissection. One who can use the knife alone is to be congratulated. He, personally, cannot do it. All who use the Sluder method agree that it must be learned, and that there are certain cases in which it is not to be applied. Of course, one must learn the dissection. But the vast majority of men can learn a dissection more easily because the instruments are more handy.

In regard to Dr. Pierce's remarks, the speaker would not think of saying that he has never left any tonsillar tissue. But he has given his work the best that is in him, and considers that is his patients' due. No tonsillectomy is a trifling affair. He considers tonsillectomy a very keen operation, worthy of the skill of the best surgeon.

The extension of lymphoid tissue, referred to by Dr. Pierce, from the postlingual tonsil into the fossa is governed somewhat by the amount that is removed. If the loop of the snare is too large, it must of necessity lie over a considerable portion of the postlingual tonsil, and if this is cut off you get a contracting scar, which is not desirable. If, however, the tonsil is dissected well down until it actually falls over into the throat, then the pedicle is quite small, and the snare can be put exactly over it. The amount of tissue to be cut in each case should be determined as an individual proposition.

In reply to Dr. Mikkelsen, the linear scar is produced by the conservation of membrane. We go as far as we can towards that end by saving all the membrane which can be saved. We only release that portion which is adherent to the tonsil, never from any part of the pillars. This membrane falls into the tonsillar fossa, which is tissue very well sup-

plied with blood, and consequently granulates very rapidly, ultimately leaving only a rudimentary fossa. The covering process is like skin grafting. Fimbriæ are thrown out which meet at the central line, and there the scar forms. If you cut too much into the dense connective tissue at the lower pole, you get a contracting scar.